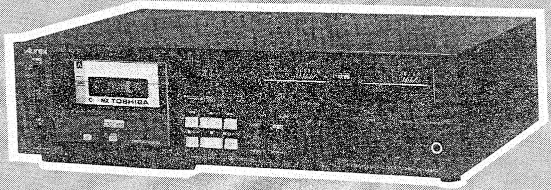
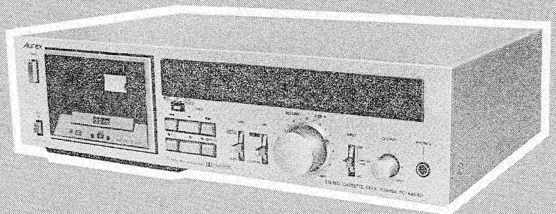
SERVICE DATA
FILE NO. 100-144

TOSHIBA
STEREO CASSETTE DECK

PC-X44AD,PC-X45AD



PC-X44AD



PC-X45AD

SPECIFICATIONS

Heads:	Record/playback AP (super AP) head, Erase AF (2-gap ferrite) head
Drive System:	2-motor IC logic control
Motors:	DC servo motor for capstan drive DC motor for reel drive
Tape Speed:	4.8 cm/sec.
Wow & Flutter:	0.035% WTD, RMS
Fast Forward and Rewind Time:	Approx. 75 sec. (C-60 tape)
Frequency Response:	20 – 19,000 Hz with metal tape and –20 dB input 20 – 18,000 with normal tape and –20 dB input 30 – 16,000 Hz with normal tape and –20 dB input
S/N Ratio:	Adres in: 88 dB (peak Level, WTD, chrome tape) Adres out: 60 dB (peak level, WTD, chrome tape)
Total Distortion:	Adres in: 0.3% (400 H, 0 dB chrome tape)
Bias Distortion:	85 kHz
Input Terminals:	MIC: 0.25 mV (600 ohm – 10 k ohm) LINE: 70 mV(50 k ohm)
Output Terminals:	LINE: 0.4 V (50 k ohm) Headphones: 0.2 mW (8 ohm)
Semiconductors:	15 ICs, 35 Transistors, 12 FETs, 50 Diodes, 7 LEDs
Power Supply	AC 240V ∿ 50 Hz (for U.K. and Australia) AC 220V ∿ 50 Hz (for European countries except U.K.) AC 115/230V ∿ 50/60 Hz (for Middle East Asia and South America) AC 120V ∿ 60 Hz (for Canada)
Major Dimensions:	420(W) x 110(H) x 280(D) mm (including front panel knobs etc. and rubber supports)
Weight:	4.2 kg
Accessories:	Connecting cables (pin-pin) x 2 Head cleaning rod.

Specification are subject to change without notice

TC, TE, TU, AY, VF

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DOLBY SYSTEM

* Noise Reduction System is manufactured under license from Dolby Laboratories.
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adres is the new noise-reduction and Automatic Dynamic Range Expansion System developed by TOSHIBA Corp., Tokyo, Japan

1. FEATURES

- Automatic dynamic range expansion system. adres

Overall S/N ratio	10 to 20 times better than conventional systems (peak level, WTD)
Dynamic range	20 to 30 times better than conventional systems (1 kHz)
Noise level	1/30 of that in conventional systems (10 kHz)
Distortion	1/2 of that in conventional systems. (400Hz, 0db)

- Feather-touch operation mode keys with built-in lamps.
  Different colored playback, record, pause, fast forward and rewind keys are a great help, especially when you are in a hurry.
- Wide range peak meters
  High-sensitivity peak indicator meters reading from –40 dB to +40 dB enable input signals to be monitored accurately.
- A super AP record/playback head for superb sound reproduction and a 2-gap AF erase head – a combination designed for optimum quality of sound.
- Record muting function built into the pause button for easier editing during recording.
- Auto repeat function for automatic repeated playback.
- Unattended recording and morning alarm playback capacities (separate audio timer required).
- Remote control (with optional remote control unit).
- Built-in Dolby NR system.

2. OPERATING CONTROLS

(The photographs are ones of PC-X45AD, Silver, European Model)

FRONT VIEW

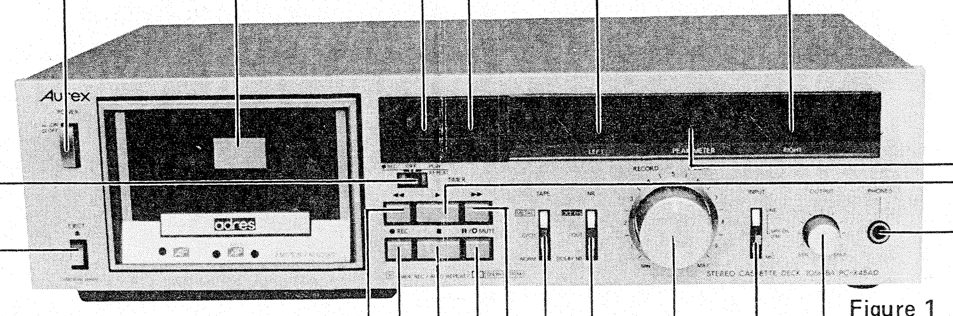


Figure 1

① **Cassette Compartment Door**

② **POWER Switch**
When POWER is switched ON, the peak level meter lamp lights up to indicate that the deck is ready for use.

③ **TIMER Standby Switch**
By using an optional audio timer unit, unattended recording and morning alarm playback are possible. Repeated playback of one side of a tape is also possible. For normal operation, leave the TIMER switch in the OFF position. (See page 6 for further details).

④ **EJECT Button**
When the tape has been stopped, press EJECT to open the cassette compartment door.

⑤ **[◀◀] Rewind Key**
Press this key to rewind the tape. (Orange, built-in lamp).

⑥ **[●] Record Key**
Recording mode is started by pressing the play key [▶] ⑯ while this key is depressed (Red, built-in lamp).
If the pause key [❙❙] ⑧ is pressed, the built-in lamp in the play key [▶] ⑯ is turned off, and the tape deck put into recording standby mode. Note, however, that the deck cannot be put into recording mode if there is no tape loaded in the cassette compartment, or if the cassette tape erasure prevention tabs have been broken off.

⑦ **[■] Stop Key**
Press this key to stop the tape.

⑧ **[❙❙/○ MUTE] Pause/Record Muting Key**
When this key is pressed during recording mode, tape transport will continue but without anything being recorded (i.e. a blank portion of tape is formed). When the key is released, a red lamp lights up and the tape is stopped temporarily (i.e. pause mode). To resume recording, simply press and release the key a second time. (See page 7 for further details).

⑨ **[▶▶] Fast Forward Key**
Press this key for rapid advance of the tape. (Orange, built-in lamp).

⑩ **TAPE Selector Switch**
Switch to the position corresponding to the type of tape being used.

⑪ **[NR] Noise Reduction Switch**

adres position
Switch to this position for adres recording and playback of adres recorded tapes. adres represents a major break-through in the elimination of unwanted noise. Tape hiss across the entire frequency range is practically non-existent, resulting in a clearer, noise-free and more enjoyable reproduction of sound. (See page 7 for further details). In this position, the adres indicator lamp lights up.

DOLBY NR position
Switch to this position for Dolby NR recording and for playback of Dolby encoded tapes. Tape hiss in the mid and high frequency regions is suppressed.

OUT position
Leave in this position when neither of the noise reduction systems is being used.

⑫ **TAPE COUNTER**
At the start of a recording, note the TAPE COUNTER reading to make it easier to locate that position later for playback. The counter may be reset to <000> to any time by pressing the reset button ⑬.

⑬ **Tape Counter Reset Button**
For resetting the tape counter to <000>.

⑭ **Peak Level Meters**
Input signal level (peak level) is indicated when recording, while the level of the signal recorded on the tape (also peak level) is indicated during playback. (See page 5 for further details).

⑮ **adres Indicator**
This indicator lights up when the noise reduction switch [NR] ⑪ is in the adres position.

⑯ **[▶] Play Key**
Press this key to play a recorded tape (i.e. commence playback mode). (Green, built-in lamp).
When the pause key [❙❙] ⑧ is pressed, the built-in lamp in this play key is turned off (playback standby mode).

⑰ **PHONES Headphone Jack**
Plug in a pair of headphones for quiet private listening.

⑱ **OUTPUT Control**
This control can be used to control the monitoring level when recording, and the normal listening level during playback. It is convenient to match this output level with the output levels from the tuner and turntable connected to the same amplifier. Note that the headphones level is also controlled by this control.

⑲ **INPUT Selector Switch**

LINE
This position is for recording from phonograph records and other tapes.

MPX ON (FM)
For recording FM stereo and TV multiplex programs.

MIC
For recording microphone inputs.

⑳ **RECORD Level Adjustment Control**
Adjust the recording level for line and mic inputs with this control (inner knob for left channel, outer ring for right channel). (See page 5 for further details).

■ Stereo Microphone Recording (Live Recording)

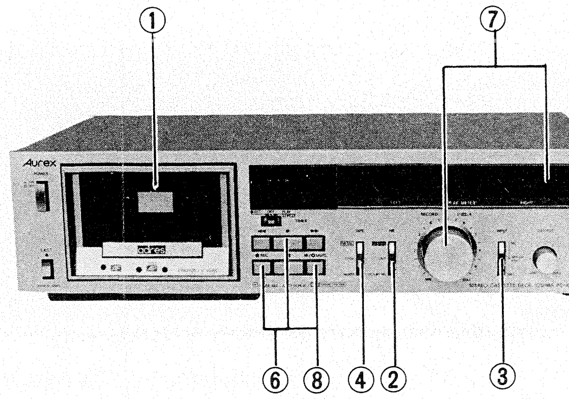


Figure 7

① Insert a cassette tape.

② Set the noise reduction switch [NR] to the desired position. The adres position is recommended for good quality high SN ratio recording.

③ Set the INPUT selector switch to the MIC position.

④ Set the TAPE selector switch to the position corresponding to the type of tape in the cassette compartment.

⑤ Plug the microphones into the rear panel MIC jacks.

⑥ After first pressing the pause key [II], press the record key [●] and play key [▶] together. (The pause key and record key indicator lamps will light up at this time to indicate that the deck is in recording standby mode).

⑦ Use the peak level meters and the RECORD level adjustment control to obtain optimum input recording level. (See page 5 for further details).

⑧ When the pause key [II] is pressed and released again, the pause key indicator lamp will turn off and the play key indicator lamp light up, indicating that the deck is now in recording mode.

Recording Level Adjustment

Generally, the type of tape used and the recording level setting will effect the recording frequency response. For example, the frequency response of metal tapes (particularly in middle and high frequency regions) is considerably better than normal tapes at the same level setting (see Fig. 8 below).

Furthermore, the recording/playback frequency response is also improved by setting the recording level at somewhat lower levels for the same tape (see Fig. 9).

If, however, the recording level is set too low, noise tends to become more prominent (i.e. SN ratio deteriorates). But since this deck incorporates the adres (Automatic Dynamic Range Expansion System), tape hiss is practically negligible. This means that recording levels in this tape deck can be set at lower values (particularly when recording program sources containing a large proportion of high frequency sounds) without noise becoming noticeable.

Hence, fine quality recordings with frequency response extending well into the high frequency region, and featuring a very high SN ratio can be achieved. Note that by using lower recording levels, the resultant playback level will also be relatively low, but this may be readily compensated by readjustment of the amplifier volume control.

The peak level meters featured in this tape deck are extremely sensitive to large transient inputs (attack time of 10 ms). In comparison with normal VU meters, transient signals read 8 to 10 dB higher in this set, while continuous "average level" signals read about 4 or 5 dB higher.

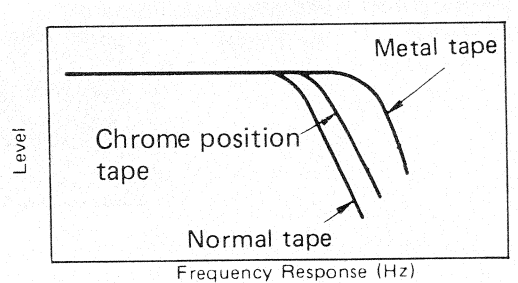


Figure 8 Frequency Response Curves for Different Types of Tapes

Table 2 Maximum Settings of Recording Level

Type of tape	Maximum level meter readings
Normal tape	−6 ~ 0 dB
Chrome position tape	−3 ~ +3 dB
Metal tape	0 ~ +6 dB

* Lower level settings are recommended for program sources with greater high frequency sound content.

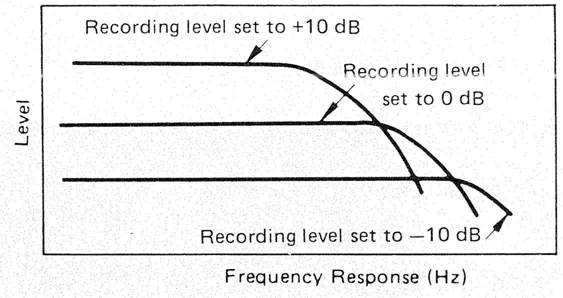


Figure 9 Frequency Response Curves at Different Recording Levels

Playback

■ Playback

After first becoming familiar with all front panel controls and their functions, commence tape playback according to the following procedure.

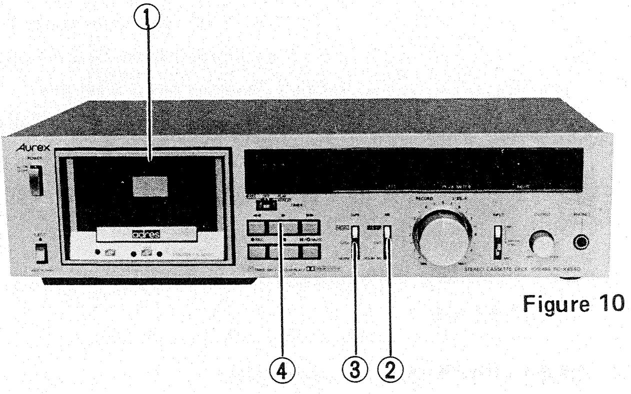


Figure 10

① Place the desired cassette tape in the cassette compartment.

② Set the noise reduction switch [NR] to the desired position.

③ Set the TAPE selector switch to the position which corresponds to the type of tape loaded in the cassette compartment.

④ Press the play key [▶]. (The built-in indicator lamp with light up green).

Note: Check that the TIMER standby switch is in the OFF position.

Unattended Recording and Morning Alarm Playback (Timer Operations)

■ Unattended Recording

Make sure that you are familiar with all front panel controls and their functions before commencing this procedure.

① Setting the recording level
After first tuning to the desired radio broadcast (tuner operation), press the pause key [II] and then the record [●] and play [▶] keys. Then adjust the recording level with the RECORD level adjustment control.

② Set the recording start time in the audio timer unit (resulting in the audio system power being switched off).

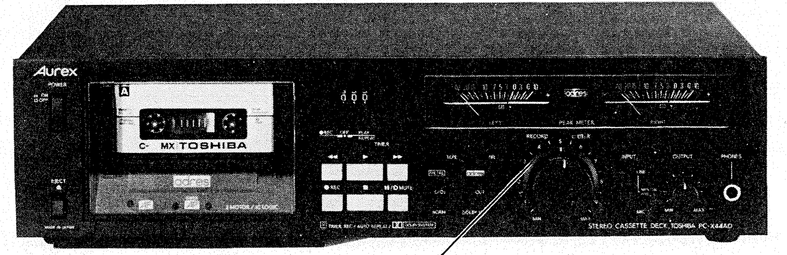
③ Set the tape deck TIMER standby switch to the REC position.

This completes the setting procedure. The audio system will be turned on and the recording commence automatically at the time preset in the audio timer.

Note:
When the end of the tape is reached during this recording mode, the tape will be stopped automatically. The amplifier, tuner and tape deck power supply, however, will remain on. It is recommended, therefore, that a 2-step audio timer capable of switching the power off again be used.
After completing the recording in this way, be sure to return the TIMER standby switch to the OFF position. Otherwise, there is danger of erasing wanted material when the tape deck is next turned on. It is a good idea to snap off the erasure prevention tabs along the back edge of the cassette after the recording has been completed.

REAR VIEW

PC-X44AD



Set Level Marker

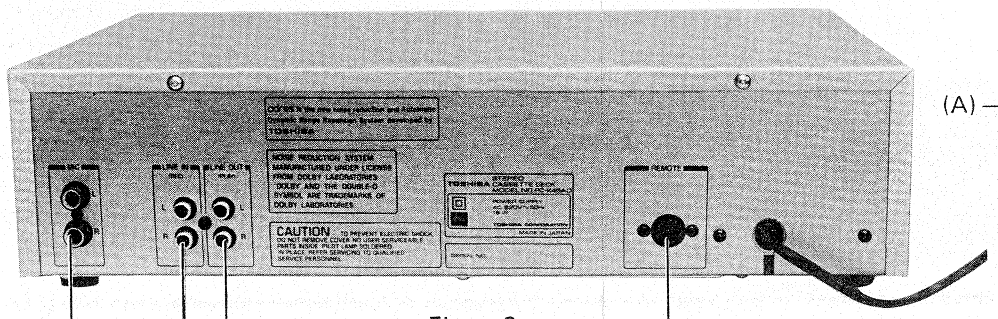
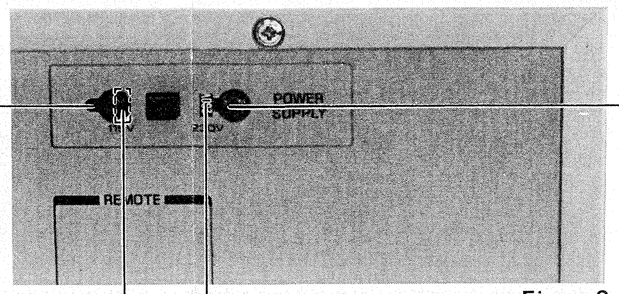


Figure 2



(A) (A)

Figure 3

115V Indicating Square Hole

230V Indicating Square Hole

NOTE: Ordinary unit has been already set to the "230V" position.

Microphone Jacks
For live microphone recording, plug in the microphones to these rear panel jacks (L – left channel, R – right channel).

LINE IN Recording Terminals
Connect to the REC OUT terminals on the rear panel of your stereo amplifier.

REMOTE CONTROL Connector
The RM-15S remote control unit may be connected here for remote control purposes.

LINE OUT Playback Terminals
Connect to the PLAY IN terminals on the rear panel of your stereo amplifier.

3. OPERATING INSTRUCTIONS

Connections

■ Connecting to stereo amplifier

- Connect the connecting cables (stereo connecting cables) to the rear panel terminals and amplifier terminals as shown in the following diagram. Note that the red plugs are used for the right channel in order to avoid confusion and incorrect connections.

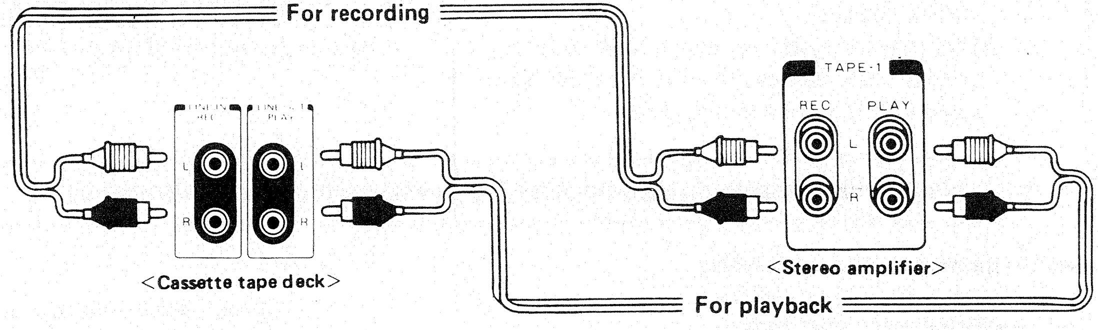


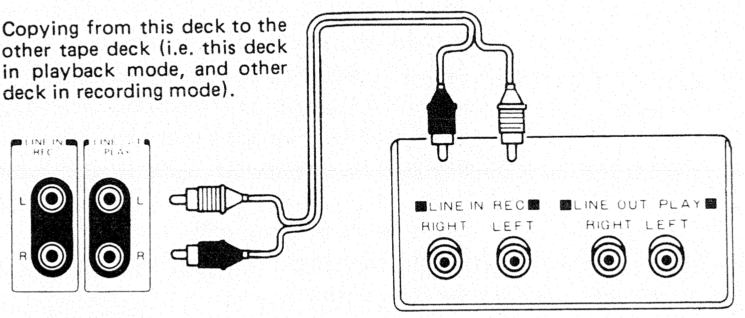
Figure 4

Note: ★Check that the amplifier power switch is off before making any connections.
★Insert all plugs firmly and securely. Loose connections can result in noise and other failures.

■ Connecting to another tape deck (direct)

- When using another tape deck for dubbing (copying) and editing purposes, connect directly to the rear panel terminals of the other deck as shown in the following diagram.

Note, however, that with stereo amplifiers equipped with dubbing facilities, connect via the amplifier according to the amplifier Owner's Manual.



Copying from this deck to the other tape deck (i.e. this deck in playback mode, and other deck in recording mode).

Figure 5

Recording

Before commencing any recording, first familiarize yourself with all front panel controls and their functions.

Note: Make sure that the TIMER standby switch is in the OFF position.

■ Recording from Phonograph Records or Tuner

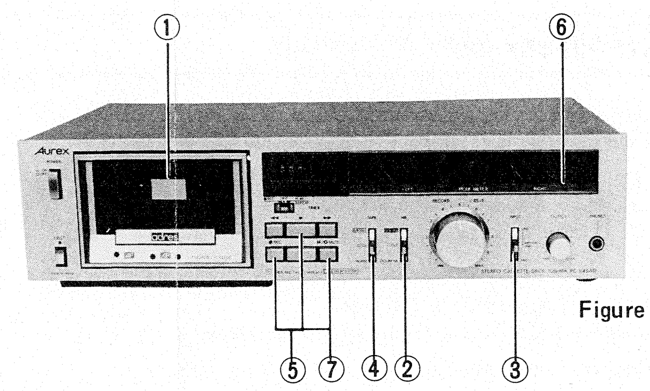


Figure 6

① Place a cassette tape in the cassette compartment.

② Set the noise reduction switch [NR] to the desired position. The adres position is recommended for good quality recordings with high SN ratio.

③ Set the INPUT selector switch to the desired position.

LINE	for phonograph records or AM band broadcasts.
MPX ON .. (FM)	for FM stereo or TV multiplex broadcasts.

④ Set the TAPE selector switch to the position corresponding to the type of tape loaded in the cassette compartment.

⑤ After first pressing the pause key [II], press the record key [●] and play key [▶] together. (The pause key and record key indicator lamps will light up at this time).

⑥ Use the peak level meters and the RECORD level adjustment control to adjust the input level to the best recording level. (See page 7 for further details).

⑦ When the pause key [II] is then pressed and released again, the pause key indicator lamp will turn off and the play key indicator lamp light up to indicate that the deck is now in recording mode.

4. DISASSEMBLY INSTRUCTIONS

(The photgraphs of PC-X45AD, Silver, European Model)

TOP COVER REMOVAL

1. Remove four screws Ⓐ (3φ x 8mm) from each side of the top cover as shown in Figure 13.
2. Remove two screws Ⓑ (3φ x 8mm) from back side of the top cover.
   Then, the top cover can be removed from the unit as shown in Figure 14.

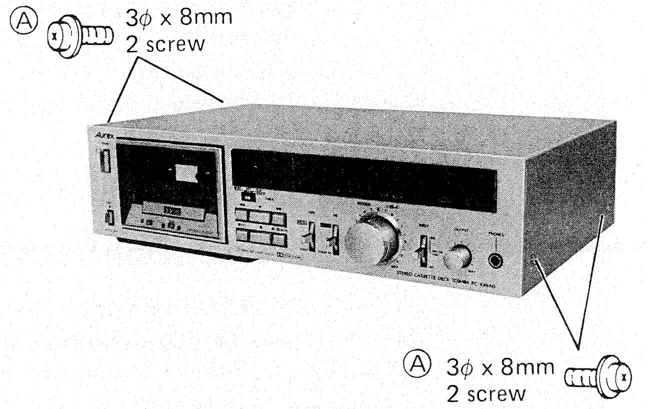

Ⓐ 3φ x 8mm
2 screw
Ⓐ 3φ x 8mm
2 screw

Figure 13

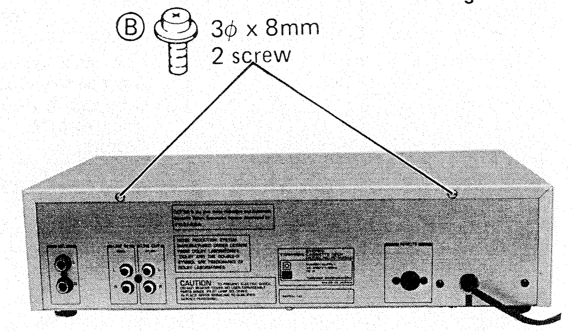

Ⓑ 3φ x 8mm
2 screw

Figure 14

BOTTOM PLATE REMOVAL

1. Remove four screws Ⓒ (3φ x 8mm) holding the bottom plate. Then, the bottom plate can be removed from the unit, and the P.C. Board can be checked easily as shown in Figure 15.

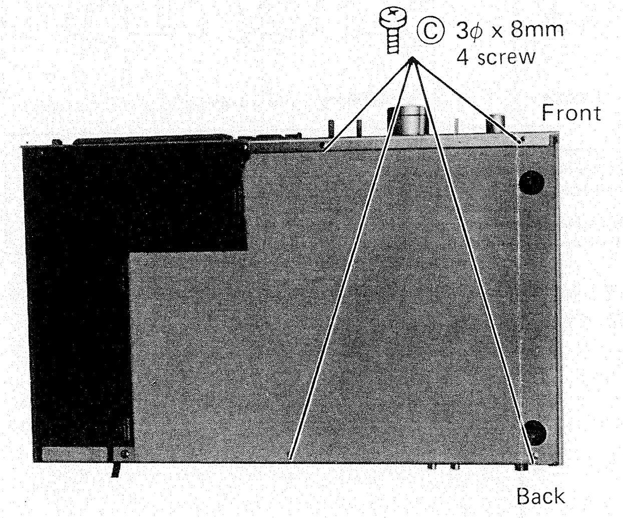

Ⓒ 3φ x 8mm
4 screw
Front
Back

Figure 15

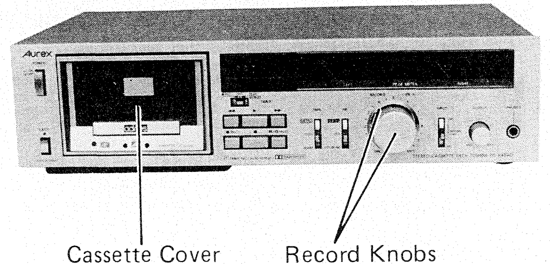

Cassette Cover
Record Knobs

Figure 16

FRONT PANEL REMOVAL

1. Remove the top cover.
2. Remove the cassette cover and record knobs as shown in Figure 16.

* Cassette Cover Removal
Pulling the cassette door upward as it is open, it can be removed from the cassette holder. See Figure 17.

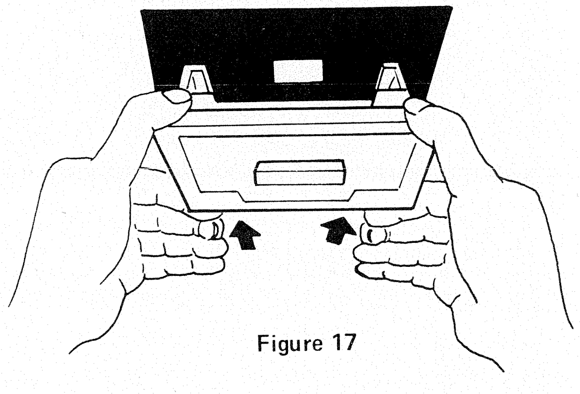


Figure 17

3. Remove the hexagon nut as shown in Figure 18.
4. Remove one screw Ⓓ (3φ x 8mm) from left side of the unit holding the front panel as shown in Figure 19.
5. Remove four screws Ⓔ (3φ x 8mm) from bottom side of the unit as shown in Figure 20.

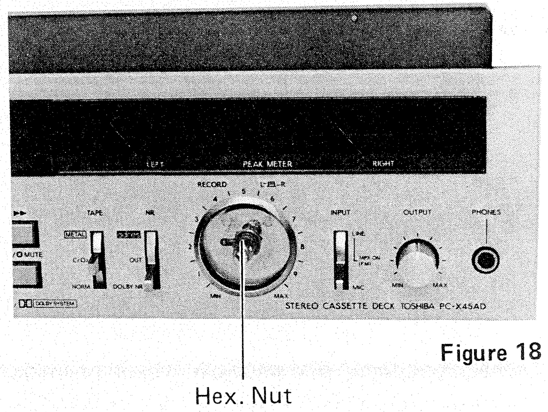


Figure 18

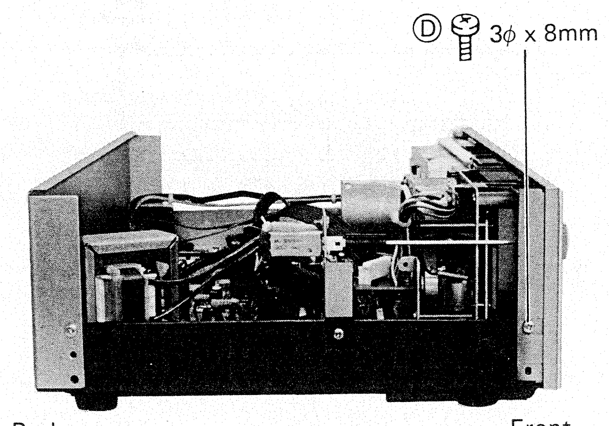

Ⓓ 3φ x 8mm
Back
Front

Figure 19

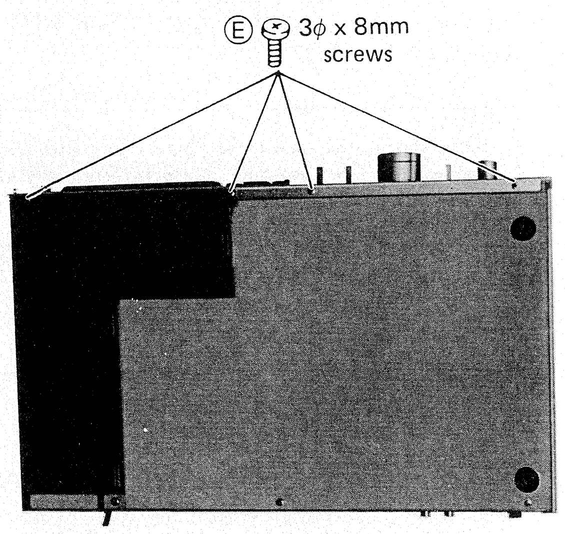

Ⓔ 3φ x 8mm
screws

Figure 20

6. Remove two screws Ⓖ (3φ x 12mm) holding meter reflector case as shown in Figure 21.
7. Remove four red screws Ⓕ (3φ x 8mm) holding the mechanism assembly as shown in Figure 21.
   Then, the front panel can be removed from the unit.

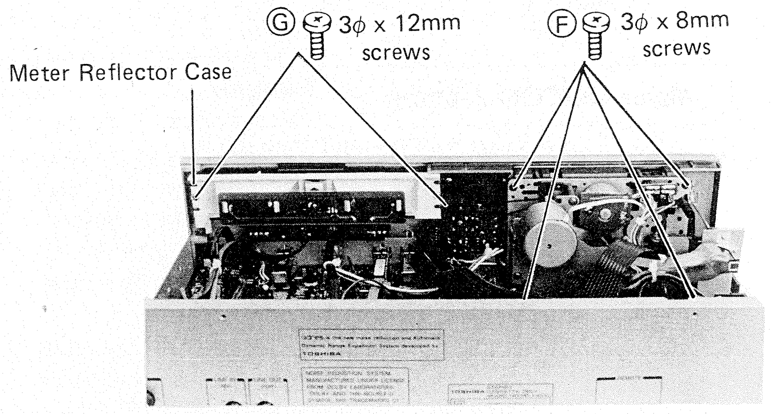

Ⓖ 3φ x 12mm
screws
Ⓕ 3φ x 8mm
screws
Meter Reflector Case

Figure 21

■ Morning Alarm Playback

① Insert the tape you wish to use as the morning alarm. Put the deck into playback mode and adjust the amplifier volume control to a suitable level.

② Set the alarm time in the audio timer unit (resulting in the power supply being switched off).

③ Set the tape deck TIMER standby switch to the PLAY position.

This completes the morning alarm playback setting procedure. Playback will commence automatically at the time preset in the audio timer unit.

Note:
If the end of the tape is reached in this mode, the tape will be rewound and playback recommenced automatically.
If the morning alarm playback is no longer required, be sure to switch the power off, and return the TIMER standby switch to the OFF position.

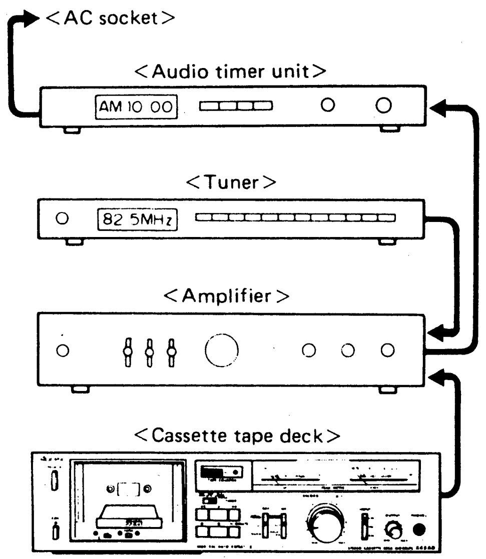


Figure 11

Note: The power switches for the amplifier, tuner and tape deck must all be left in the ON position.

Auto-Repeat Playback

Auto-repeat playback mode is started by setting the TIMER standby switch to the PLAY/REPEAT position, and then pressing the play key [▶] or the rewind key [◀◀]. To cancel this mode, simply press the stop key [■].

① **Playback → rewind → playback (repeated)**
When the play key [▶] is pressed, the tape will play until the end, automatically rewind, and then recommence to play from the start of the tape.

② **Rewind → playback → rewind (repeated)**
If the rewind key [◀◀] is pressed, the tape will be rewound to the start where playback will commence automatically.

Note:
When morning alarm playback is set, playback will be repeated until otherwise stopped.

Major adres Features

- adres (Automatic Dynamic Range Expansion System) is a major breakthrough (successfully achieved by **TOSHIBA** engineers) in the elimination of hiss noise inherent to tape. (This noise is the result of the tape being narrow and moving slowly.)
- adres contains a variable emphasis circuit designed to vary the emphasis characteristics according to the input signal level. By compression before recording and expansion during playback of the signal right across the complete frequency spectrum, a clear, powerful playback signal may be obtained with a greatly expanded dynamic range and vastly improved SN ratio.

Typical adres Results

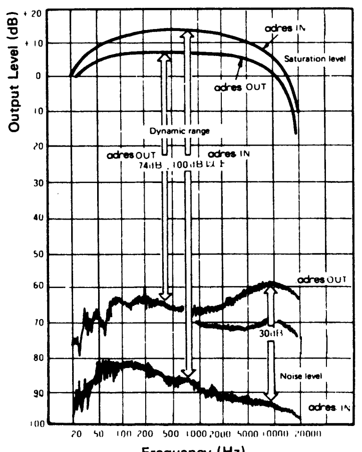
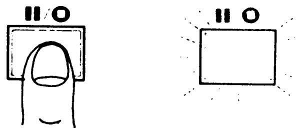
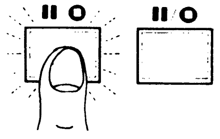
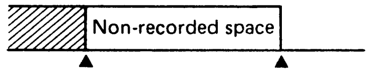
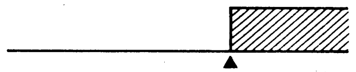


Figure 12

- Because of the effective value detector system in the adres level sensor circuit, there is practically no mis-matching due to differences in tape and tape deck characteristics. Furthermore, any mismatching between input and output levels does not result in a significant change in sound quality.
- Furthermore, by keeping the contraction/expansion ratio to a power of almost 1.5, and by incorporating the variable emphasis circuit, there is very little "breathing" phenomenon. In other words, the adres system is the right type of noise reduction system for cassette tape decks.

Mute Recording

The PAUSE/MUTE button therefore serves a dual purpose: record mute and pause.
For proper operation follow the steps given in the table just below:
This is illustrated below.

	① Making a non-recorded gap	**② Releasing the pause mode**
PAUSE/MUTE button operations	**A non-recorded gap can be created by pressing and holding the PAUSE/MUTE button during recording. When the button is released, the tape stops in the pause mode.**  Press Release	**To restart recording, momentarily press the button again.**  Press momentarily
Tape transport and record mode	 Non-recorded space Record mute starts. Tape transport stops.	 Recording starts again.

- When the button is pressed during playback, only the pause function operates. The PAUSE/MUTE button is not effective in the fast-forward and rewind modes.

5. BLOCK DIAGRAM

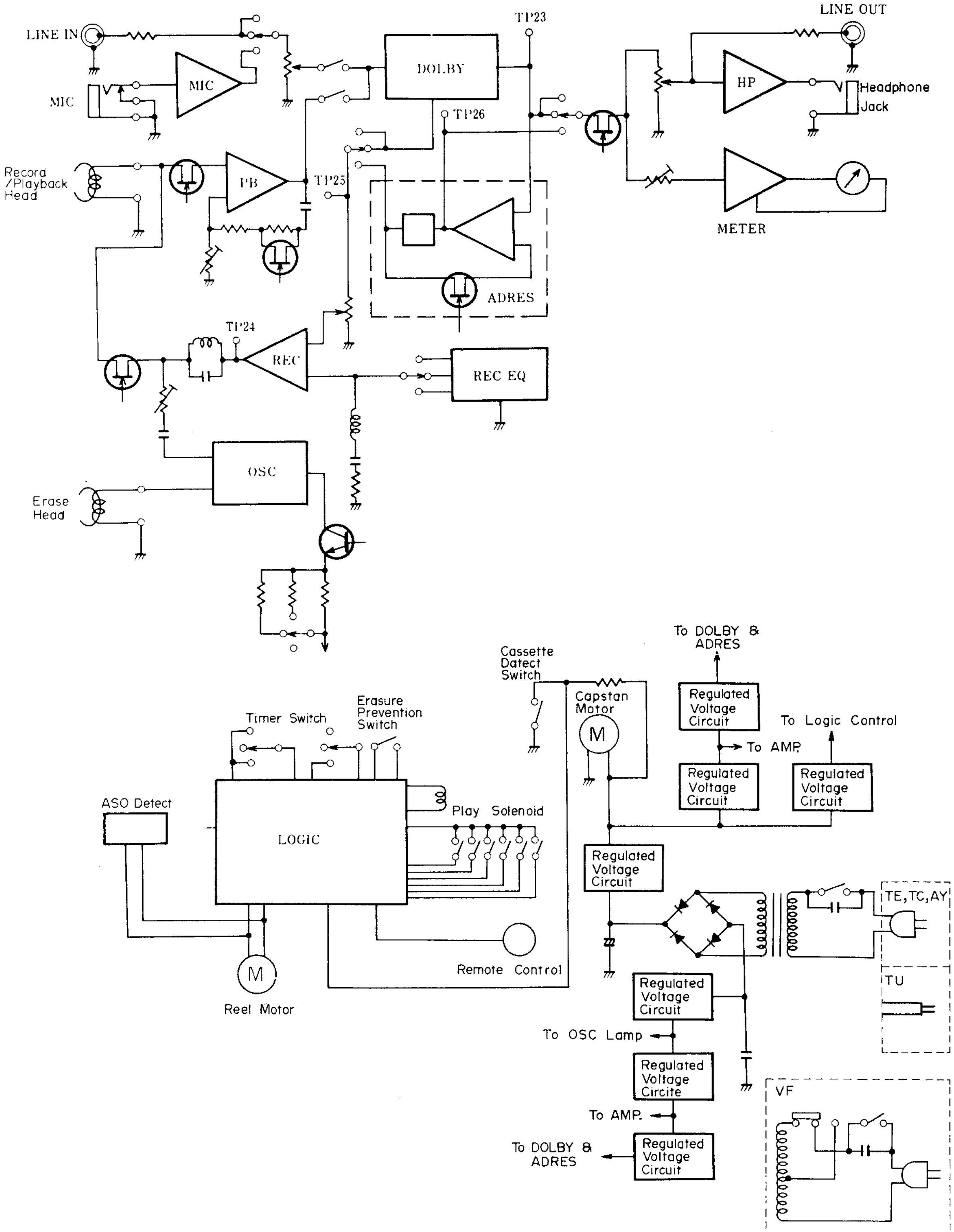

LINE IN
MIC
MIC
TP23
DOLBY
TP26
LINE OUT
HP
Headphone
Jack
Record
/Playback
Head
PB
TP25
ADRES
METER
TP24
REC
REC EQ
OSC
Erase
Head
To DOLBY &
ADRES
Cassette
Detect
Switch
Erasure
Prevention
Switch
Timer Switch
Capstan
Motor
M
Regulated
Voltage
Circuit
To Logic Control
To AMP.
Regulated
Voltage
Circuit
Regulated
Voltage
Circuit
ASO Detect
LOGIC
Play Solenoid
Regulated
Voltage
Circuit
TE,TC,AY
TU
M
Reel Motor
Remote Control
Regulated
Voltage
Circuit
To OSC Lamp
Regulated
Voltage
Circite
To AMP.
VF
To DOLBY &
ADRES
Regulated
Voltage
Circuit

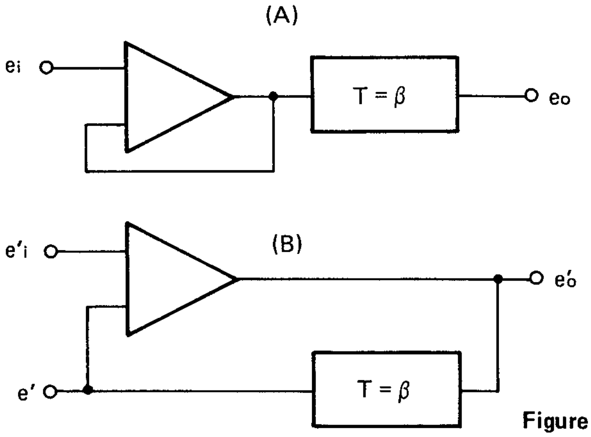
Figure 22

6. TECHNICAL POINTS

NEW adres CIRCUIT

Encoding and decoding are symmetrical to each other in operation of the adres circuit. The present circuit configuration is very complicated to permit switching of encoding and decoding. The adres new circuit has been developed to simplify the circuit configuration. It is improved as explained below.

1. A basic circuit is employed as a circuit system to obtain the inverse characteristic of transfer function.


(A)
ei
T = β
eo
e'i
(B)
e'o
e'
T = β

The transfer function TA of (A) is obtained by the equation. $TA = \frac{eo}{ei} = \beta$

The transfer function TB of (B) is obtained by the equation. $TB = \frac{eo'}{ei'} = \frac{1}{\beta}$

Figure 23

In the above drawing, if T = ß is assumed as a transfer function for decoding in the adres, the circuit (A) operates as a decoding circuit, and (B) is 1/ß, or the inverse characteristic of (A) and operates as an encoding circuit.
In the drawing (B), if G of the operation amplifier is considered as "∞", the following equation is established.

$$e' = e'o\,\beta = \frac{1}{\beta} \cdot e'i \cdot \beta = ei'$$

A signal equal to the input signal ei' can be obtained at e', and it can be used as a monitor output at decoding time. Now, the adres circuit is explained by referring to the principle diagram including switches.

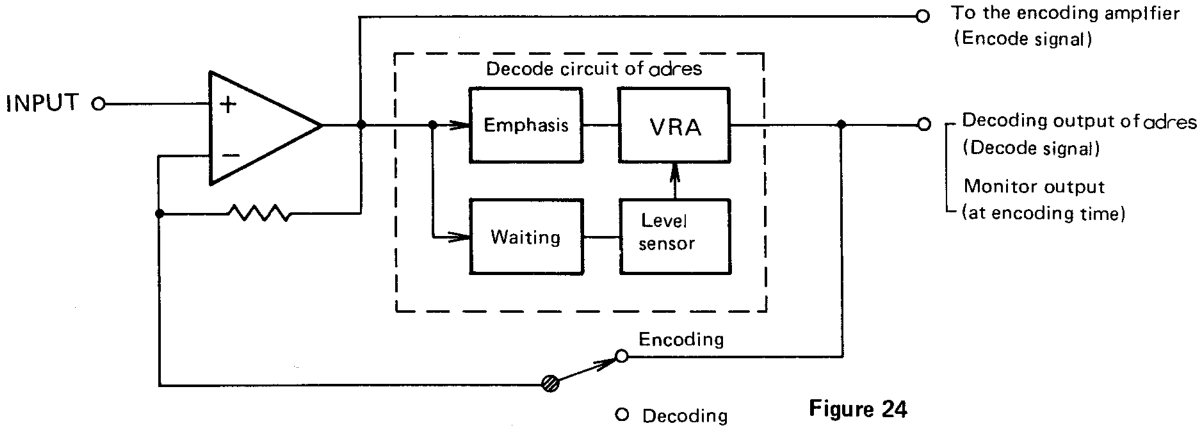

To the encoding amplfier
(Encode signal)
Decode circuit of adres
INPUT
+
–
Emphasis
VRA
Waiting
Level sensor
Decoding output of adres
(Decode signal)
Monitor output
(at encoding time)
Encoding
Decoding

Figure 24

If the decoding circuit of the present adres circuit is used in the circuit configuration as shown above, the adres operation can be obtained by switching encoding and decoding of the circuit.

2. Characteristics of the adies New adres circuit
   (1) Greatly decreased number of encode/decode switching circuits : 8 to 2 circuits/2 channels (in the basic circuit only).
   (2) Simplified circuit configuration : about 20% decrease in the number of parts.
   (3) Decreased number of adjusting parts : 8 to 6 parts/2 channels.
   (4) Completely interchangeable with the present circuit.
   (5) The decoding circuit based structure minimizes a noise at encoding time, and improves distortion.

IC LOGIC CONTROL

Timing is actually taken for each operation, but not considered in the description given here. A change (voltage change) generated by depression of the control button is followed sequentially in each circuit.

Since operation of IC is complicated, only the change in input and output is described. Thus, follow the peripheral circuits in sequence.

The control IC used in this circuit is designed to generate a positive voltage in the output when the input voltage is lowered to the grounding level.

PLAYBACK

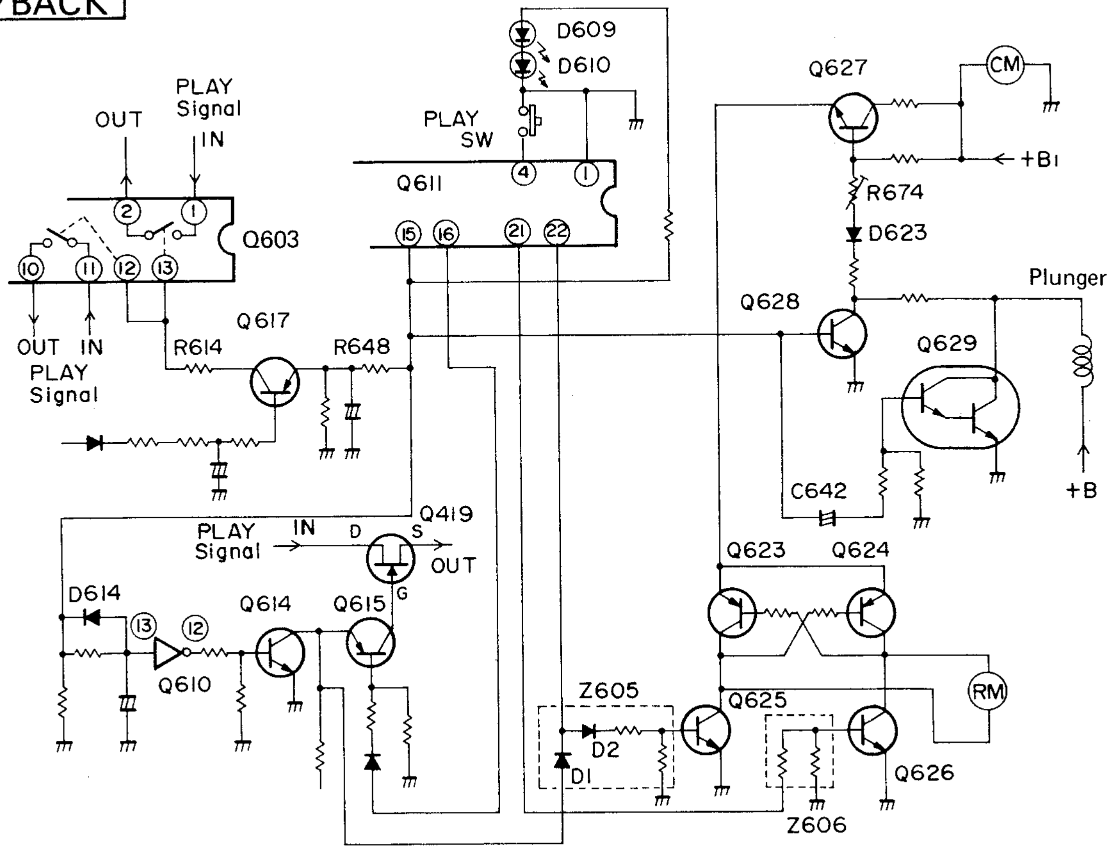

D609
D610
PLAY SW
Q611
④
①
⑮
⑯
㉑
㉒
Q627
CM
+B1
R674
D623
Plunger
Q628
Q629
+B
C642
OUT
PLAY Signal IN
②
①
Q603
⑩
⑪
⑫
⑬
OUT IN
PLAY Signal
Q617
R614
R648
Q419
PLAY Signal
IN
D
S
G
OUT
D614
⑬
⑫
Q610
Q614
Q615
Q623
Q624
Z605
D2
D1
Q625
RM
Q626
Z606

Figure 25

SW(PLAY) ON → Q611 ⑮ ↑

Q611④ ↓

(CM rotates when the power is turned on.)

→ Q628,629 Base ↑ ON → Plunger turns ON, and head slider rises. (Tape and head touches.)

→ Q610⑫ ↓ → Q614 Base ↓OFF → Q615 Emitter ↑ON → Q419 Gate ↑ ON (Signal passes)

→ Q617 Emitter ↑ON → Q617 Collector ↑ → Q603 SW①-②, ⑩-⑪ ON (Changes over to playback channel.)

→ Q628 Collector ↓ → D623 Cathode ↓ ON → Q603 Emitter generates an output voltag at playback (determined by R674).

→ Q610⑬↑ → Q610⑫↓ → Q614 Base ↓ OFF → Q614 Collector ↑ → Z605(D1) ON → Z605(D2) ON → Q625 Base ↑ ON → Q625 turns ON, Flow +B → Q624 → RM → Q625 → Ground, Motor rotates (Motor torque is determined by R674.)

RECORDING

Mechanical operation is the same as in playback, and omitted here.

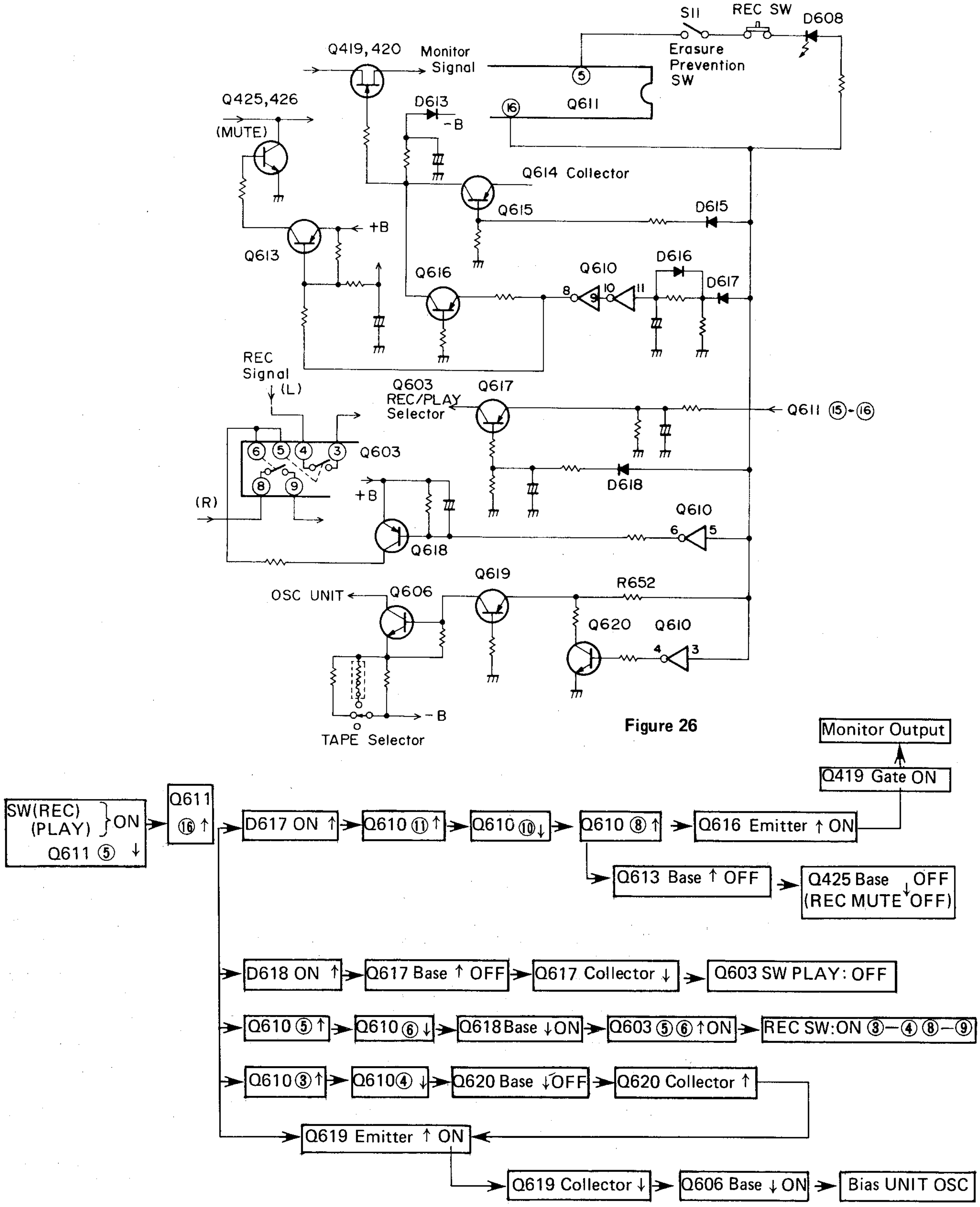

S11
REC SW
D608
Erasure Prevention SW
Q419,420
Monitor Signal
⑤
Q611
⑯
Q425,426
(MUTE)
D613
-B
Q614 Collector
Q615
D615
+B
Q613
Q616
Q610
D616
D617
8
9
10
11
REC Signal
(L)
Q603 REC/PLAY Selector
Q617
Q611 ⑮-⑯
⑥ ⑤ ④ ③
Q603
⑧ ⑨
(R)
+B
D618
Q610
6
5
Q618
Q619
R652
OSC UNIT
Q606
Q620
Q610
4
3
-B
TAPE Selector
Monitor Output
Q419 Gate ON
SW(REC) (PLAY) ON Q611 ⑤ ↓
Q611 ⑯ ↑
D617 ON ↑
Q610 ⑪ ↑
Q610 ⑩ ↓
Q610 ⑧ ↑
Q616 Emitter ↑ ON
Q613 Base ↑ OFF
Q425 Base ↓ OFF (REC MUTE OFF)
D618 ON ↑
Q617 Base ↑ OFF
Q617 Collector ↓
Q603 SW PLAY: OFF
Q610 ⑤ ↑
Q610 ⑥ ↓
Q618 Base ↓ ON
Q603 ⑤⑥ ↑ ON
REC SW: ON ③—④ ⑧—⑨
Q610 ③ ↑
Q610 ④ ↓
Q620 Base ↓ OFF
Q620 Collector ↑
Q619 Emitter ↑ ON
Q619 Collector ↓
Q606 Base ↓ ON
Bias UNIT OSC

Figure 26

FAST FORWARD/REWIND(FF/REW)

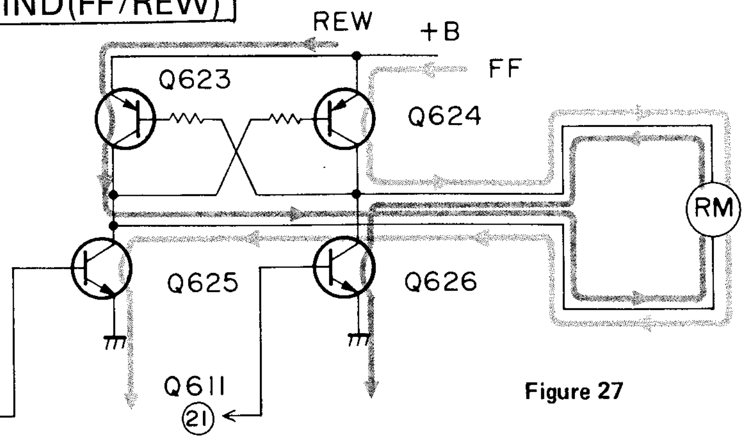

REW
+B
FF
Q623
Q624
RM
Q625
Q626
Q611
㉒
Q611
㉑

Figure 27

- **FF Operation**

FF operation is the same as for playback

SW(FF) ON Q611③ ↓ ➤ Q611↑ ㉒ ➤ Q625Base ↑ ON ➤ Q625 Collector ↓ ➤ Q624 Base ↓ ON ➤ Q624 turns ON, Flow +B ➤ Q624 ➤ RM ➤ Q625 ➤ Ground, the motor rotates in FF direction

- **REW Operation**

SW(REW) ON Q611 2 ↓ ➤ Q611 ↑ ㉑ ➤ Q626 Base ↑ ➤ Q626 Collector ↓ ➤ Q623 Base ↓ ON ➤ Q623 turns ON, Flow +B ➤ Q623 ➤ RM ➤ Q626 ➤ Ground, the motor rotates in inverse direction of FF.

REC MUTE/PAUSE

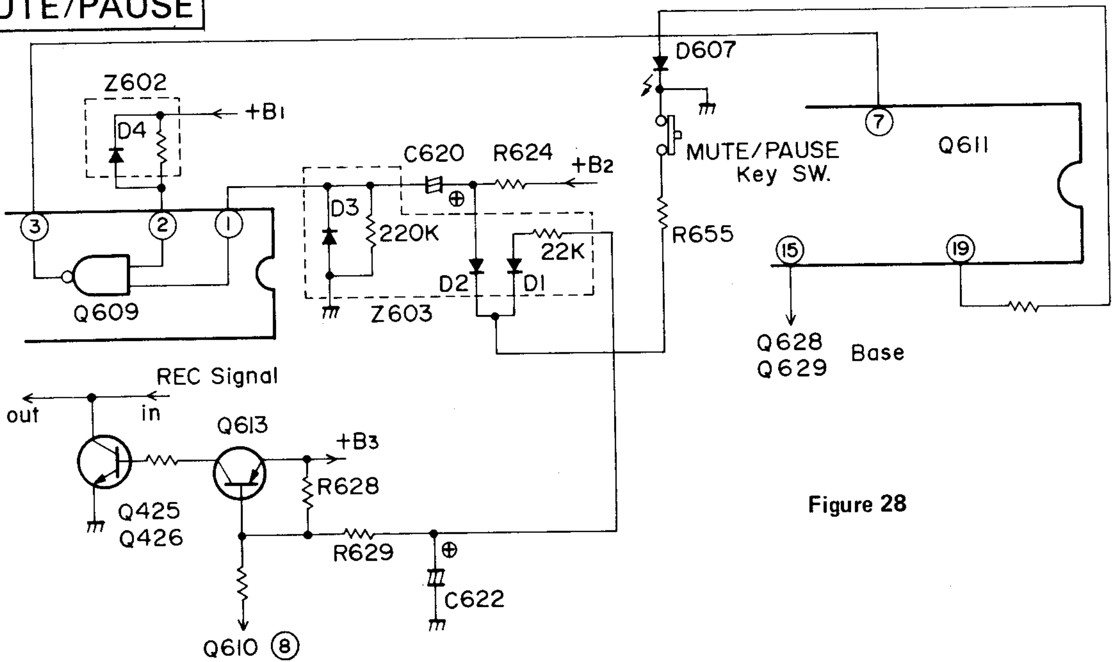

Z602
D4
+B1
C620
R624
+B2
D3
220K
22K
D2
D1
Z603
D607
MUTE/PAUSE
Key SW.
R655
⑦
Q611
⑮
⑲
Q628
Q629
Base
③
②
①
Q609
REC Signal
out
in
Q613
+B3
R628
R629
Q425
Q426
C622
Q610 ⑧

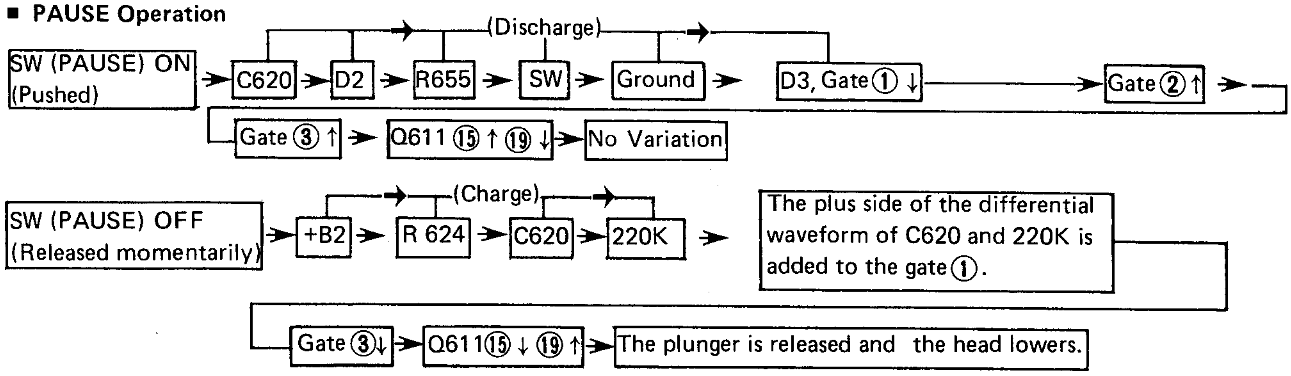
Figure 28

- **REC MUTE Operation**

SW (MUTE/PAUSE) ON (Pushed) ➤ C622 Stored charge ➤ Z603 (22K ➤ D1) ➤ R655 ➤ SW ➤ Discharge thourgh ground, Q613 Base ↓ ON ➤ Q613 Collector ↑ ➤ Q425 Base ↑ ON ➤ The signal falls on ground, resulting no recording.

SW (MUTE/PAUSE) OFF (Released to Push) ➤ B3 ➤ R628 ➤ R629 ➤ Charge through C622, Q613 Base ↑ OFF ➤ Q613 Collector ↓ ➤ Q425 Base ↓ OFF ➤ The signal is recorded

- **PAUSE Operation**


(Discharge)
SW (PAUSE) ON (Pushed)
C620
D2
R655
SW
Ground
D3, Gate ① ↓
Gate ② ↑
Gate ③ ↑
Q611 ⑮ ↑ ⑲ ↓
No Variation
(Charge)
SW (PAUSE) OFF (Released momentarily)
+B2
R 624
C620
220K
The plus side of the differential waveform of C620 and 220K is added to the gate ①.
Gate ③ ↓
Q611 ⑮ ↓ ⑲ ↑
The plunger is released and the head lowers.

ASO

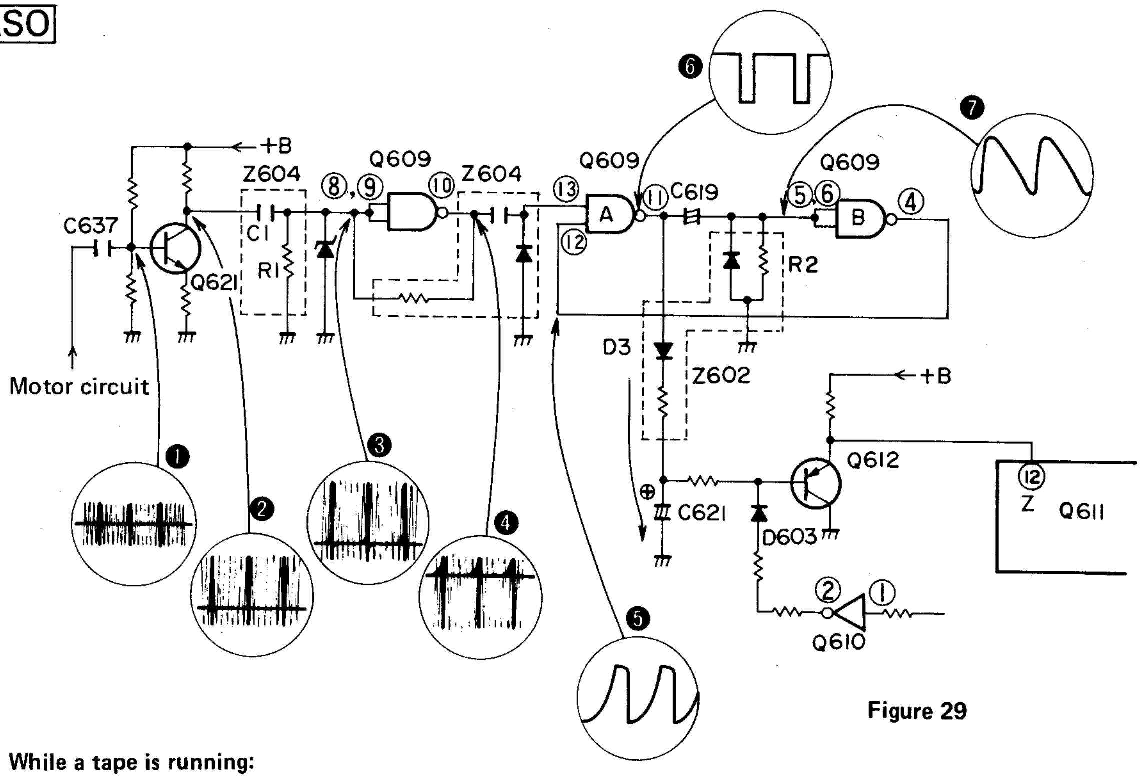

❻
❼
+B
Z604
Q609
⑧,⑨
⑩
Z604
Q609
⑬
⑪
C619
Q609
⑤⑥
④
A
B
⑫
C637
C1
R1
Q621
R2
D3
Z602
+B
Motor circuit
❶
❷
❸
❹
Q612
⑫
Z
Q611
⊕
C621
D603
②
①
Q610
❺

Figure 29

- **While a tape is running:**

Since the reel motor rotates while a tape is running, a motor noise ❶ is supplied to Q621 base through C637. The motor noise is amplified by Q621, and the differentiated by Z604 (C1, R1), and added to Q609 (⑧ , ⑨) where it is amplified and inversed.

The inversed negative pulse (trigger pulse) ❹ is used as a one-shot multitrigger pulse for the next Q609 (A, B). Since the above trigger pulse is added to multi Q609 ⑬ when a tape is running and the reel motor is rotating, inversion is repeated, and a pulse with negative polarity is generated at multi Q609 ⑪ .

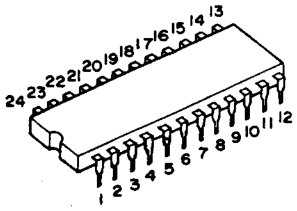
The pulse generated at ⑪ is rectified by D3, and used to charge C621 as shown in the above diagram. Thus, Q612 base is raised to OFF, and the emitter voltage is also raised. This causes the Z-terminal ⑫ of Q611 to rise, and no variation occurs.

- **When a tape is wound to the end:**

When a tape is wound to the end, the motor noise stops, no trigger pulse enters into multi Q609 ⑬. Thus, the motor stops stably, no negative pulse is generated at multi Q609 ⑪ , and Q612 base lowers to ON.

By turning on Q612, Q612 emitter lowers, the Z-terminal ⑫ of Q611 lowers, a stop command is issued, and Q611 ⑮ lowers. Thus, the plunger circuit stops. (No current flows in the plunger, and the head slider lowers.)

7. IC BLOCK DIAGRAM


24 23 22 21 20 19 18 17 16 15 14 13
1 2 3 4 5 6 7 8 9 10 11 12

TC9121P

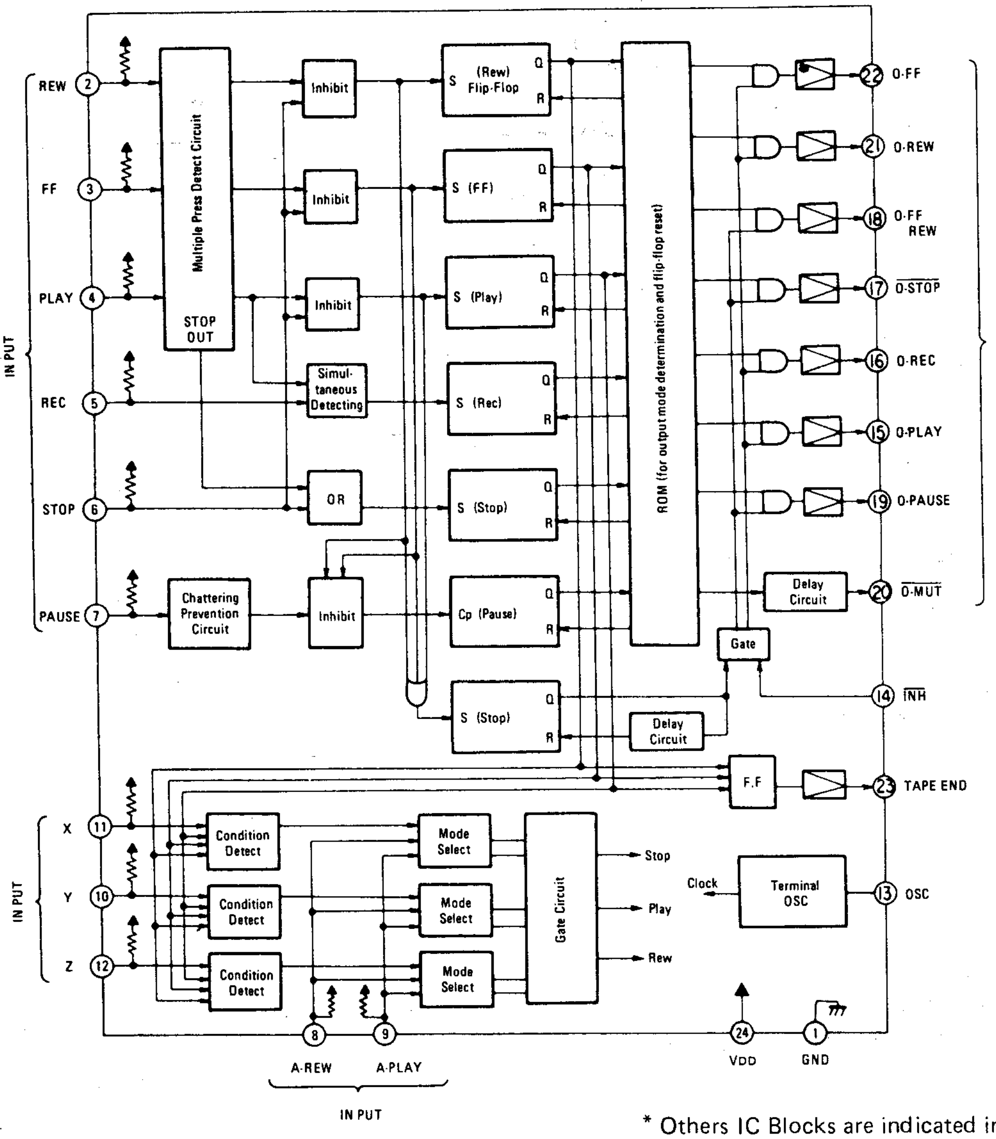

REW 2
FF 3
PLAY 4
REC 5
STOP 6
PAUSE 7
IN PUT
Multiple Press Detect Circuit
STOP OUT
Inhibit
Inhibit
Inhibit
Simultaneous Detecting
OR
Chattering Prevention Circuit
Inhibit
S (Rew) Flip-Flop Q R
S (FF) Q R
S (Play) Q R
S (Rec) Q R
S (Stop) Q R
Cp (Pause) Q R
S (Stop) Q R
ROM (for output mode determination and flip-flop reset)
Delay Circuit
Gate
Delay Circuit
F.F
22 O-FF
21 O-REW
18 O-FF REW
17 $\overline{\text{O-STOP}}$
16 O-REC
15 O-PLAY
19 O-PAUSE
20 $\overline{\text{O-MUT}}$
OUT PUT
14 $\overline{\text{INH}}$
IN PUT
23 TAPE END
OUT PUT
X 11
Y 10
Z 12
IN PUT
Condition Detect
Mode Select
Gate Circuit
Stop
Play
Rew
Clock
Terminal OSC
13 OSC
24 VDD
1 GND
8 A-REW
9 A-PLAY
IN PUT

Figure 30

* Others IC Blocks are indicated in Schematic Diagram. (See Page 20)

8. ELECTRICAL ADJUSTMENTS

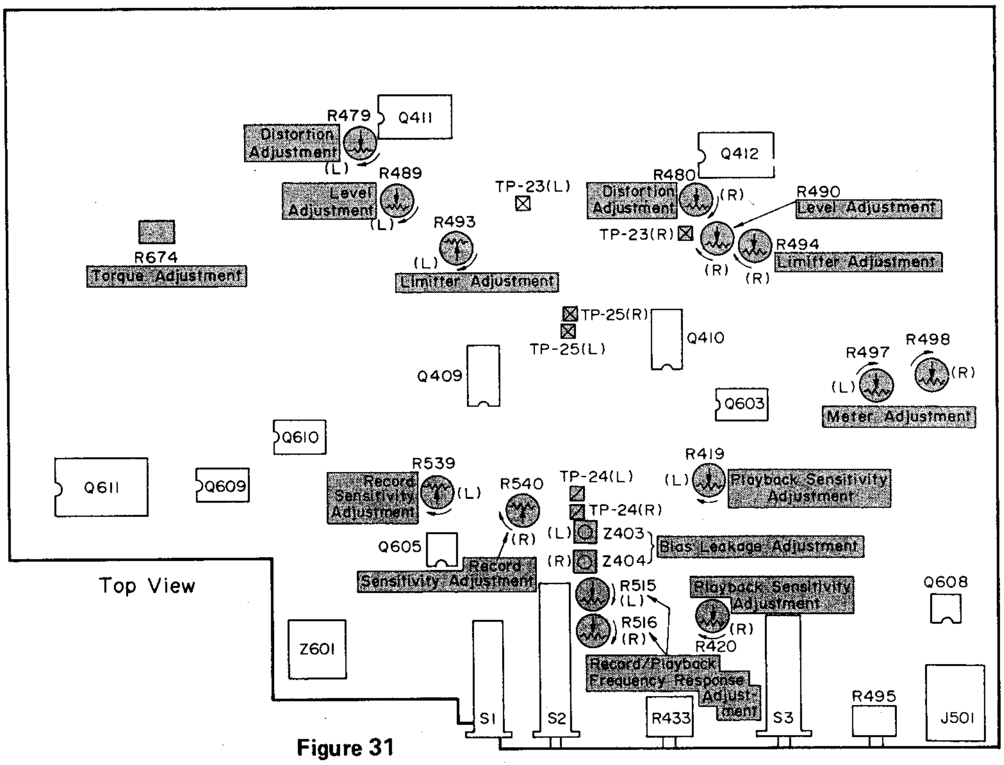

R479
Q411
Distortion Adjustment
(L)
R489
Level Adjustment
(L)
R493
(L)
Limitter Adjustment
TP-23(L)
R674
Torque Adjustment
Q412
R480
Distortion Adjustment
(R)
R490
Level Adjustment
TP-23(R)
R494
Limitter Adjustment
(R)
(R)
TP-25(R)
TP-25(L)
Q410
Q409
R497
R498
(L)
(R)
Meter Adjustment
Q603
Q610
R419
(L)
Playback Sensitivity Adjustment
R539
Record Sensitivity Adjustment
(L)
R540
TP-24(L)
TP-24(R)
(R)
Q605
Record Sensitivity Adjustment
(L) Z403
(R) Z404
Bias Leakage Adjustment
Q611
Q609
Top View
R515
(L)
R516
(R)
Playback Sensitivity Adjustment
(R)
R420
Q608
Z601
Record/Playback Frequency Response Adjustment
R495
R433
S1
S2
S3
J501

Figure 31

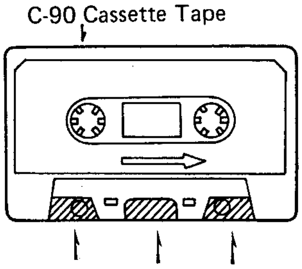
TEST EQUIPMENTS

1. VTVM (Vacuum Tube Voltmeter)
2. Signal Generator
3. Resistance Attenuator
4. Screwdriver
5. Test Tapes:
   MTT-111 (Speed 3KHz –5db)
   MTT-114 (Azimuth 10 kHz)
   MTT-150 (Dolby 400 Hz Modulation)
   AC-512 (Chrome Tape)

TAPE HEAD HEIGHT ADJUSTMENT

ADJUSTMENT

1. Prepare cassette tape for adjustment as shown in the following illustration.
   The mirrow cassette tape, (MC-09C) may be used.


C-90 Cassette Tape

The oblique lined part must be taken off.

Figure 32

2. Set in PLAY position.
   Adjust the height of the tape head to confirm that tape is not curled at the arrow point.See Figure 33.

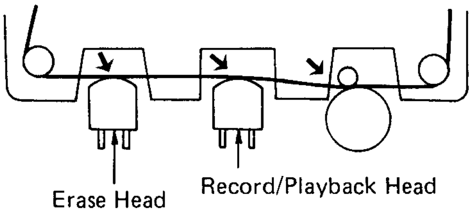
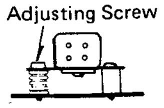
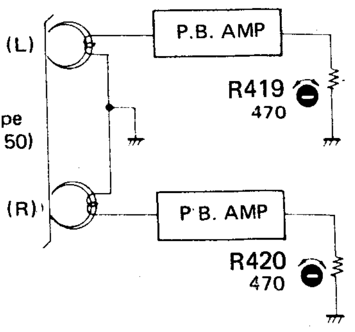

Erase Head
Record/Playback Head

Figure 33

■ ADJUSTMENT PROCEDURES

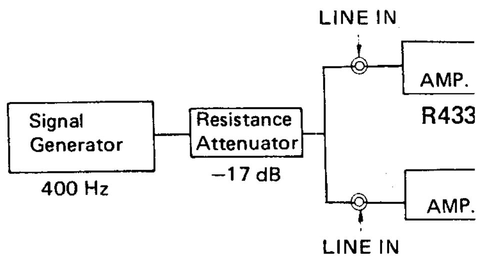
No.	Adjusment Item	Test Value	Test Tape	Volume Control		Switch Position			Adjustable Parts	Test Point	Input Frequency (ATT)	Remarks
				REC	OUT	TAPE	NR	INPUT				
1	Head Azimuth Adjustment	Maximum	MTT-114	–	MAX	NOR	OUT	LINE	Adjusting Screw 	LINE OUT	–	Apply a lock paint after adjustment.
2	Tape Speed	3000 ±30 Hz	MTT-111	–	MAX	NOR	OUT	LINE	Internal Semifixed VR of Motor	LINE OUT	–	Take-up beginning of tape.
3	Output Sensitivity Adjustment	580 ±10 mV	MTT-150	–	MAX	NOR	OUT	LINE	R419, 420	TP23L, R	–	
4	Line Input Sensitivity Adjustment	580 ±10 mV	–	Adjustment	MAX	CrO_2	OUT	LINE	REC-VR	TP23L, R	400 Hz – 17 dB	Do not vary REC-VR after adjustment.
5	Meter Adjustment	Meter Indication 0 dB	–	Adjustment	MAX	CrO_2	OUT	LINE	R497,498	Meter Scale	400 Hz, –20 dB	
6	Adres Adjustment											
(1)	Level (Rec)	300 mV	–	Adjustment	MAX	CrO_2	Adres	LINE	R489, 490	TP25L, R	1 kHz, – 23 dB	
(2)	Distortion Ratio (Rec)	$\leqq$ 0.2%	–	Adjustment	MAX	CrO_2	Adres	LINE	R479, 480	TP25L, R	1 kHz – 23 dB	
(3)	Level Confirmation (Rec)	300 mV	–	Adjustment	MAX	CrO_2	Adres	LINE	–	TP25L, R	1 kHz – 23 dB	
(4)	Limitter (Rec)	–2 dB	–	Adjustment	MAX	CrO_2	Adres	LINE	R493, 494	TP25L, R	1 kHz – 10 kHz –23 dB	Variation of 10 kHz to 1 kHz.
7	R/P Frequency Adjustment	0 ±1 dB	AC-512	Adjustment	MAX	CrO_2	Adres	LINE	R515, 516	LINE OUT	400 Hz 10 Hz –40 dB	Variation of 10 KHz to 400 Hz.
8	R/P Sensitivity Adjustment	Monitor Output	AC-512	Adjustment	MAX	CrO_2	Adres	LINE	R419, 420	LINE OUT	400 Hz, –17 dB	Monitor Output: 560 mV. (Reference Value)
Measurement Condition	● Power Supply: TE=220V, TU/AY=240V, VF=115/230V, TC=120V ● Input: 0 dB: 1V rms ● LINE IN (Input Impedance): 600 ohms ● LINE OUT (Load Impedance): 47K ohm ●Test Point Load Impedance: Non Load.											

(Playback Sensitivity Adjustment)


R/P Head (L)
P.B. AMP
R419
470
Test Tape
(MTT-150)
R/P Head (R)
P.B. AMP
R420
470

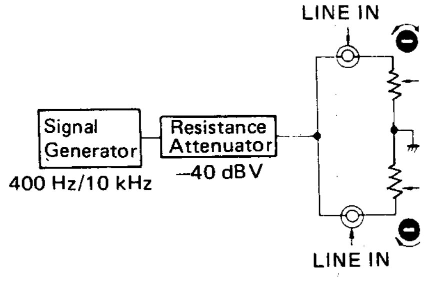
Fig

(Line Input Adjustment)


LINE IN
AMP.
R433
Signal Generator
400 Hz
Resistance Attenuator
–17 dB
AMP.
LINE IN

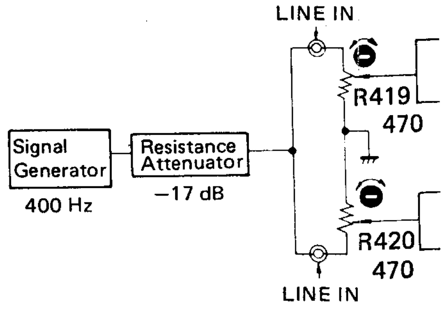
Fig

(Rec/Play Frequency Characteristic Adjustm

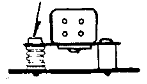

LINE IN
Signal Generator
400 Hz/10 kHz
Resistance Attenuator
–40 dBV
LINE IN

Fi

(Rec/Play Sensitivity Adjustment)


LINE IN
R419
470
Signal Generator
400 Hz
Resistance Attenuator
–17 dB
R420
470
LINE IN

F

ape	Volume Control		Switch Position			Adjustable Parts	Test Point	Input Frequency (ATT)	Remarks
	REC	OUT	TAPE	NR	INPUT				
114	–	MAX	NOR	OUT	LINE	Adjusting Screw 	LINE OUT	–	Apply a lock paint after adjustment.
111	–	MAX	NOR	OUT	LINE	Internal Semifixed VR of Motor	LINE OUT	–	Take-up beginning of tape.
150	–	MAX	NOR	OUT	LINE	R419, 420	TP23L, R	–	
	Adjustment	MAX	CrO$_2$	OUT	LINE	REC-VR	TP23L, R	400 Hz – 17 dB	Do not vary REC-VR after adjustment.
	Adjustment	MAX	CrO$_2$	OUT	LINE	R497,498	Meter Scale	400 Hz, –20 dB	
	Adjustment	MAX	CrO$_2$	Adres	LINE	R489, 490	TP25L, R	1 kHz, – 23 dB	
	Adjustment	MAX	CrO$_2$	Adres	LINE	R479, 480	TP25L, R	1 kHz – 23 dB	
	Adjustment	MAX	CrO$_2$	Adres	LINE	–	TP25L, R	1 kHz – 23 dB	
	Adjustment	MAX	CrO$_2$	Adres	LINE	R493, 494	TP25L, R	1 kHz – 10 kHz –23 dB	Variation of 10 kHz to 1 kHz.
12	Adjustment	MAX	CrO$_2$	Adres	LINE	R515, 516	LINE OUT	400 Hz 10 Hz –40 dB	Variation of 10 KHz to 400 Hz.
12	Adjustment	MAX	CrO$_2$	Adres	LINE	R419, 420	LINE OUT	400 Hz, –17 dB	Monitor Output: 560 mV. (Reference Value)

/AY=240V, VF=115/230V, TC=120V
IN (Input Impedance): 600 ohms
: 47K ohm ● Test Point Load Impedance: Non Load.

(Playback Sensitivity Adjustment)

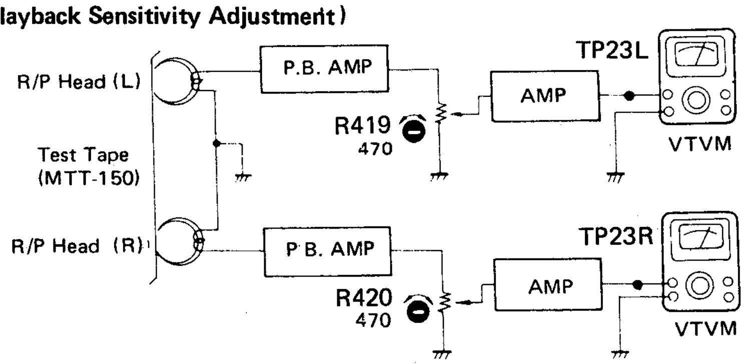

R/P Head (L)
P.B. AMP
TP23L
AMP
R419
470
VTVM
Test Tape
(MTT-150)
R/P Head (R)
P B. AMP
TP23R
AMP
R420
470
VTVM

Figure 34

(Line Input Adjustment)

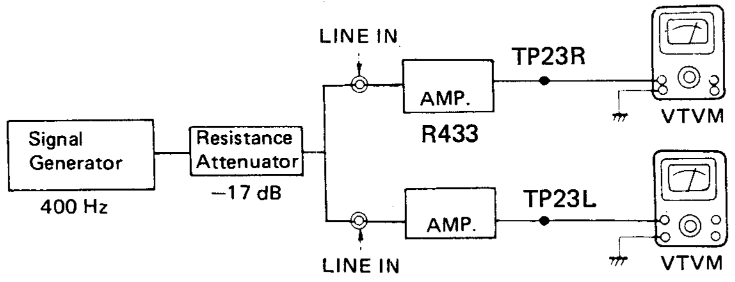

LINE IN
TP23R
AMP.
R433
VTVM
Signal Generator
400 Hz
Resistance Attenuator
–17 dB
AMP.
TP23L
LINE IN
VTVM

Figure 35

(Rec/Play Frequency Characteristic Adjustment)

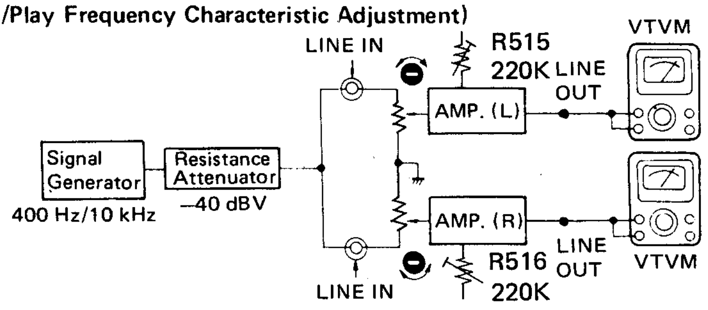

LINE IN
R515
220K
LINE OUT
VTVM
AMP. (L)
Signal Generator
400 Hz/10 kHz
Resistance Attenuator
–40 dBV
AMP. (R)
LINE OUT
R516
220K
LINE IN
VTVM

Figure 36

(Rec/Play Sensitivity Adjustment)

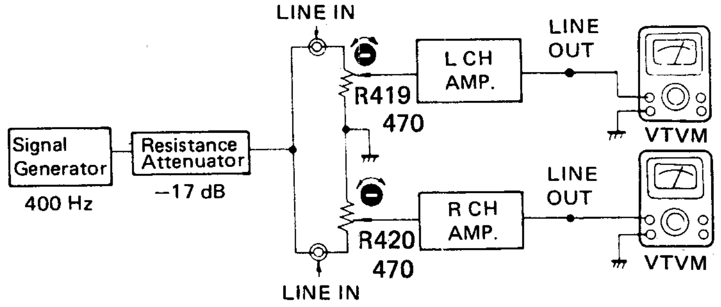

LINE IN
LINE OUT
L CH AMP.
R419
470
VTVM
Signal Generator
400 Hz
Resistance Attenuator
–17 dB
LINE OUT
R CH AMP.
R420
470
VTVM
LINE IN

Figure 37

Q405,406

E	0V
B	0.6V (R) 0V

Q423,424

C	-6.5V
B	2.5V

Q425,426

B	0V (R) 0.7V (REC MUTE) 0.7V

Q604

C	-7.2V (R) -2.1V
B	-6.6V (R) -7.2V

Q606

E	-5.9V (NOR) -7.7V (CrO_2) (R) -11.4V (METAL) -12.9V (Others)
C	-5.7V (NOR) -7.6V (CrO_2) (R) -11.1V (MEAL) 0V (Others)
B	-5.2V (NOR) -7V (CrO_2) (R) -10.7V (METAL) -12.9V (Others)

Q613

E	6.3V (STOP) 6V (MOV.)
C	6.3V (REC MUTE) 0V (R) 6.3V
B	5.7V (REC MUTE) 6.3V (R) 5.7V

Q614

C	4.2V (P) 4.5V (R) 0V
B	0V (P,R) 0.7V

Q615

C	4.2V (P,R) -11.8V
B	3.6V (P) 4.7V (R) 0V

Q616

E	4.2V (R) 0V
B	3.6V (R) 0V

Q617

E	4.6V (P) 4.9V (R) 0V
C	4.6V (P) -7.1V
B	4V (P) 4.7V (R) 0V

Q618

E	6.3V (STOP) 6V (MOV.)
C	6.2V (R) -7.2V
B	5.7V (R) 6.3V

Q619

E	0.8V (R) 0V
C	-9.2V (METAL) -5.6V (CrO_2) (R) -3.7V (NOR) -12.9V (Others)
B	0.2V (R) 0V

Q620

C	0.8V (R) 0V
B	0V (R) 0.7V

Q621

E	0.1V
C	0.3V
B	0.7V

Q622

C	OPEN 0V CLOSE 6.3V
B	OPEN 0.7V CLOSE 0V

Q623

B	4.2V (P,R) 10.9V (W) 11.8V

Q409,410 (TA7629P)

16	15	14	13	12	11	10	9
3.7V	1.3V	0.4V	0V	0V	DOLBY OUT 4.8V IN 0V	0V	0V
1	2	3	4	5	6	7	8
7.2V	0V	-7.2V	0V	-0.2V	0V	-2.1V -7.2V (R)	0V

Q411,412 (TA7605AP)

20	19	18	17	16	15	14	13	12	11
7.2V	0V	0.6V	0.7V	1.3V	7.2V	0.6V	0V	0.6V	0V
1	2	3	4	5	6	7	8	9	10
7.2V	0V	0.7V	1.3V	0V	7.2V	0.3V	0V	0V	0V

Q415,416 (TA75458S)

1	2	3	4	5	6	7	8	9
			0V	7.2V	0V	0V	0V	7.2V

Q601 (NJM4558D-A)

5	6	7	8
0V	0V	0V	10V
4	3	2	1
-10V	0V	0V	0V

Q605 (NJM4558D-A)

8	7	6	5
11.7V	0V	0V	0V
1	2	3	4
0V	0V	0V	-12.1V

Q602 TA7325P-JA

1	2	3	4	5	6	7	8	9
0.8V	1.3V	3.6V	9.4V	0V	3.6V	1.3V	0.8V	0V

Q603 (TC4016BP)

7	6	5	4	3	2	1
-7.2V	6.2V(R) -7.1V	6.2V(R) -7.1V	0V	0V	0V	0V
8	9	10	11	12	13	14
0V	0V	0V	0V	4.5V(P) -7V	4.5V(P) -7V	7.2V

Q607 (TA7318P-2)

1	2	3	4	5	6	7	8	9
0V	-7.9V		0	-7.9V	0V		-7.9V	7.9V

Q608 (NJM45558D-A)

4	3	2	1
-12.1V	0V	0V	0V
5	6	7	8
0V	0V	0V	11.7V

Q609 (TC4011UBP)

7	0V (STOP) 0V (Others)	8	3V (MOV. PULSE 5V) 3V (Others)
6	0V (STOP) 4V (MOV.) 0V (Others)	9	3V (MOV. PULSE 5V) 3V (Others)
5	0V (STOP) 4V (MOV.) 0V (Others)	10	5V (MOV. PULSE 0V) 6V (Others) 0V (STOP)
4	6.3V (STOP) 4.5V (MOV.) PULSE 0.5V) 6V (Others)	11	5V (MOV. PULSE 0V) 0V (STOP) 0V Others
3	6.3 (STOP) 6V (S5 ON,OFF) 6V-0V (S5 ON-OFF PULSE 5V)	12	6.3 (STOP) 6V (MOV.)
2	6V (MOV.) 6.3 (STOP)	13	6.3V (STOP) 4.8V (MOV. PULSE 0.5V) 6.3V (STOP)
1	6V (STOP) 0V (S5 ON,OFF) 4V (S5 ON-PULSE 1V)	14	6.3V (STOP) 6V

Q610 (TC4069UBP)

8	9	10	11	12	13	14
6.2V (R) 0V	0V (R) 6.3V	0V (R) 6.3V		0V P,R 6V		6.3V (STOP) 6V (MOV)
7	6	5	4	3	2	1
0V	0V (R) 6.3V	5.4V (R) 0V	0V (R) 6V	5.4V (R) 0V	0V (P,R,F,W) 6.2V	0V 3.2V(P) 3.6V(R) 4.7V(F) 5.2V(W)

Q611 (TC9121P)

12	6V (STOP) 4.8V (P,FF, REW)	13	———
11	6.3V	14	6V
10	6.3V	15	0V 5.4V (P)
9	6.3V	16	0V 5.4V (R)
8	6.3V	17	———
7	6.3V	18	———
6	6.3V	19	0V 5.5V
5	6.3V	20	———
4	6.3V	21	0V 5.5V
3	6.3V	22	0V 5.5V
2	6.3V	23	———
1	0V	24	6.3V

Q624

E	4.2V (P,R) 11.6V (F,W) 12.3V
B	3.5V (P,R) 10.9V (F) 11.8V

Q625

C	0.1V (P,R,F) 11.8V
B	0.7V (P,R,F)

Q626

C	4.2V (P,R) 0V (W) 11.8V
B	0.7V (W)

Q627

C	4.2V
B	4.9V (P,R) 12.3V (F,W) 12.6V

Q628

C	16.7V 0.1V (P,R)

Q629

C	16.8V 13.0V (P,R)

NOTE

(P)	Playback
(R)	Recording
(F)	Fast Forward (FF)
(W)	Rewind (REW)
(PA)	Pause
(MOV)	Moving

9. ELECTRICAL PARTS LOCATIONS

Q411,412 (TA7605AP)

11	12	13	14	15	16	17	18	19	20
0V	0.6V	0V	0.6V	-7.2V	1.3V	0.7V	0.6V	0V	7.2V
10	9	8	7	6	5	4	3	2	1
0V	0V	0V	0.3V	7.2V	0V	1.3V	0.7V	0V	-7.2V

Q415,416 (TA75458S)

1	———
2	
3	
4	0V
5	-7.2V
6	0V
7	0V
8	0V
9	7.2V

Q601 (NJM4558D-A)

4	-10.0V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	10V

Q409,410 (TA7629P)

8	0V	9	0V
7	-2.1V -7.2V(R)	10	0V
6	0V	11	DOLBY out 4.8V in 0V
5	-0.2V	12	0V
4	0V	13	0V
3	-7.2V	14	0.4V
2	0V	15	1.3V
1	7.2V	16	3.7V

Q607 (TA7318P)

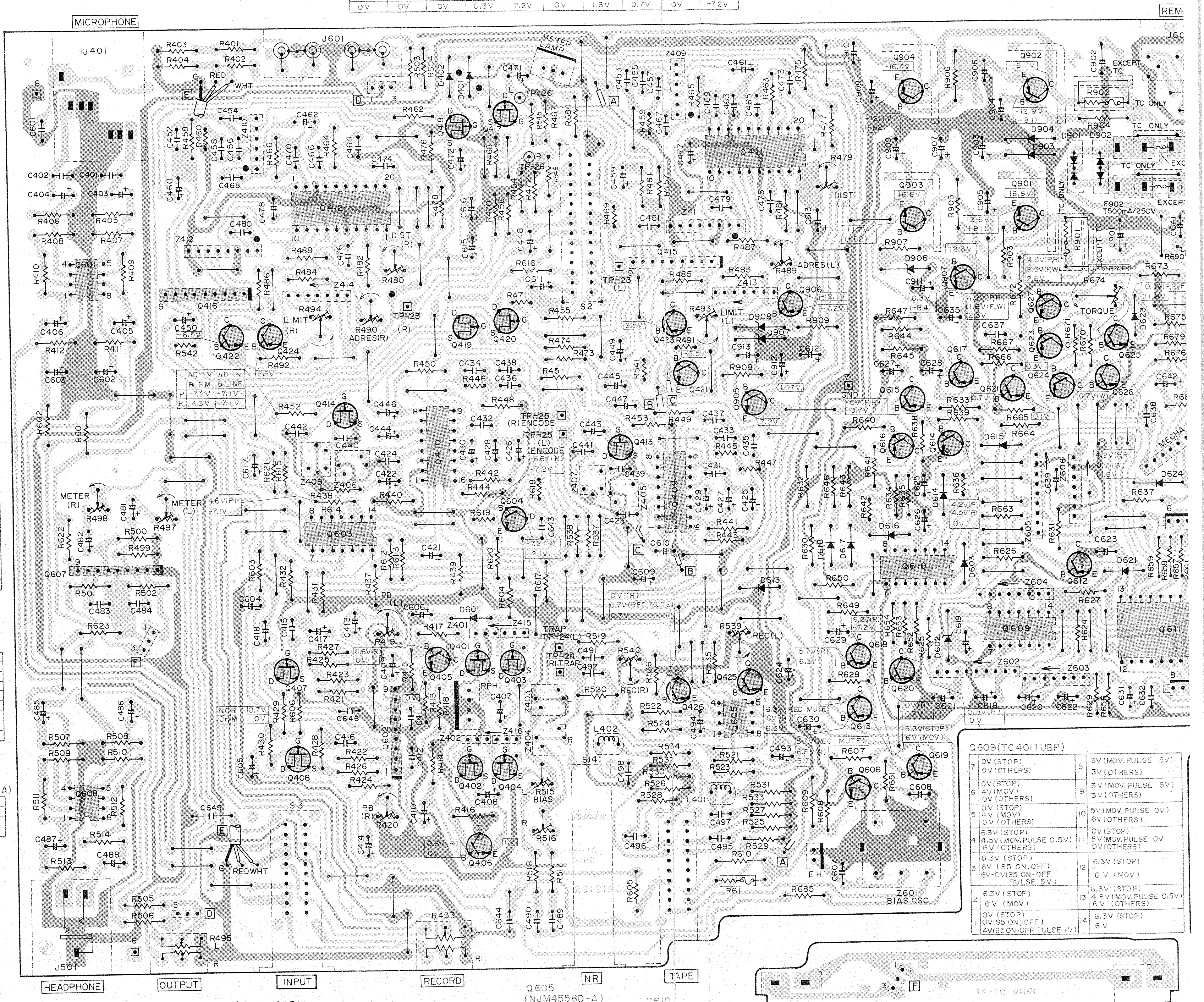
1	0V
2	-7.9V
3	———
4	0V
5	-7.9V
6	0V
7	———
8	-7.9V
9	7.9V

Q602 (TA7325P)

1	0.8V
2	1.3V
3	3.6V
4	9.4V
5	0V
6	3.6V
7	1.3V
8	0.8V
9	0V

Q608 (NJM4558D-A)

4	-12.1V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	11.7V



Q609 (TC4011UBP)

7	0V (STOP) 0V (OTHERS)	8	3V (MOV, PULSE 5V) 3V (OTHERS)
6	0V (STOP) 4V (MOV) 0V (OTHERS)	9	3V (MOV, PULSE 5V) 3V (OTHERS)
5	0V (STOP) 4V (MOV) 0V (OTHERS)	10	5V (MOV, PULSE 0V) 6V (OTHERS)
4	6.3V (STOP) 4.5V (MOV, PULSE 0.5V) 6V (OTHERS)	11	0V (STOP) 5V (MOV, PULSE 0V 0V (OTHERS)
3	6.3V (STOP) 6V (S5 ON, OFF) 6V-0V (S5 ON-OFF PULSE 5V)	12	6.3V (STOP) 6V (MOV)
2	6.3V (STOP) 6V (MOV)	13	6.3V (STOP) 4.8V (MOV, PULSE 0.5V) 6V (OTHERS)
1	0V (STOP) 0V (S5 ON, OFF) 4V (S5 ON-OFF PULSE 1V)	14	6.3V (STOP) 6V

Q603 (TC4016BP)

8	9	10	11	12	13	14
0V	0V	0V	0V	4.5V(P) -7V	4.5V(P) -7V	7.2V
7	6	5	4	3	2	1
-7.2V	6.2V(R) -7.1V	6.2V(R) -7.1V	0V	0V	0V	0V

Q605 (NJM4558D-A)

4	-12.1V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	11.7V

Q610 (TC4069UBP)

8	9	10	11	12	13	14
6.2V(R) 0V	0V(R) 6.3V	0V(R) 6.3V	———	0V(P,R) 6V	———	6.3V(STOP) 6V (MOV)
7	6	5	4	3	2	1
0V	0V (R) 6.3V	5.4V(R) 0V	0V (R) 6V	5.4V(R) 0V	0V(P,R,F,W) 6.2V	0V 3.2V(P) 3.6V(R) 4.7V(F) 5.2V(W)

Q606

E	-5.9V(NOR) -7.7V(CrO_2) R -11.4V(Metal) -12.9V(Others)	C	-5.7V(NOR) -7.6V(CrO_2) R -11.1V(Metal) 0 V(Others)	B	-5.2V(NOR) -7V(CrO_2) -10.7V(Metal) -12.9V(Others

Figure 38

9. ELECTRICAL PARTS LOCATIONS

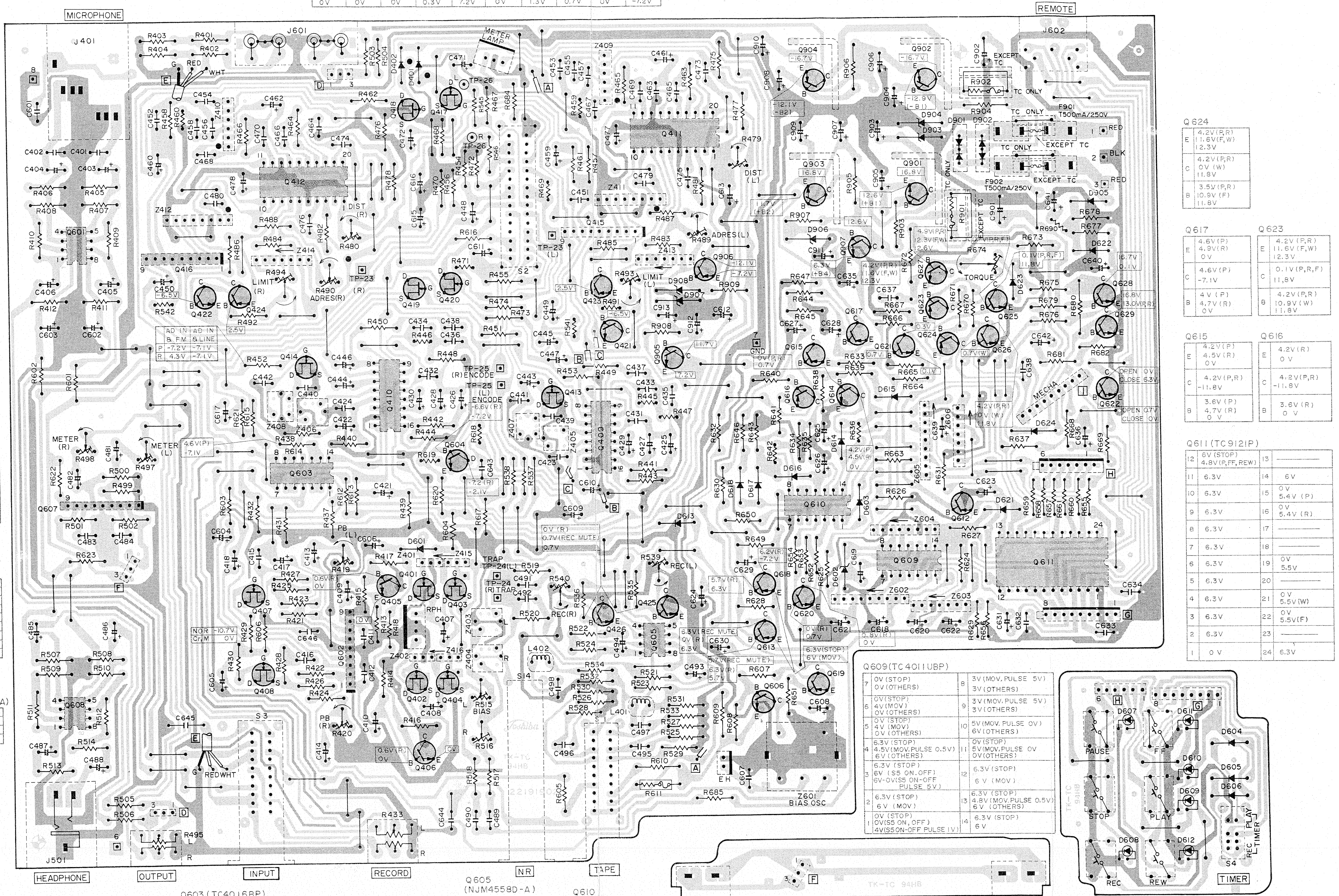

MICROPHONE
J401
J601
METER LAMP
REMOTE
J602
F901 T500mA/250V
F902 T500mA/250V
TC ONLY
EXCEPT TC
RED
BLK
ADRES(L)
ADRES(R)
LIMIT(R)
LIMIT(L)
DIST(L)
DIST(R)
TORQUE
MECHA
ENCODE
TRAP
REC(L)
REC(R)
BIAS
Z601 BIAS OSC
METER(R)
METER(L)
PB(L)
PB(R)
PAUSE
FF
STOP
PLAY
REC
REW
S4
TK-TC 94HB
HEADPHONE
J501
OUTPUT
INPUT
RECORD
NR
TAPE
TIMER

Figure 38

Q411, 412 (TA7605AP)

11	12	13	14	15	16	17	18	19	20
0V	0.6V	0V	0.6V	-7.2V	1.3V	0.7V	0.6V	0V	7.2V
10	9	8	7	6	5	4	3	2	1
0V	0V	0V	0.3V	7.2V	0V	1.3V	0.7V	0V	-7.2V

Q415, 416 (TA75458S)

1	————
2	
3	
4	0V
5	-7.2V
6	0V
7	0V
8	0V
9	7.2V

Q601 (NJM4558D-A)

4	-10.0V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	10V

Q409, 410 (TA7629P)

8	0V	9	0V
7	-2.1V -7.2V(R)	10	0V
6	0V	11	DOLBY out 4.8V in 0V
5	-0.2V	12	0V
4	0V	13	0V
3	-7.2V	14	0.4V
2	0V	15	1.3V
1	7.2V	16	3.7V

Q607 (TA7318P)

1	0V
2	-7.9V
3	————
4	0V
5	-7.9V
6	0V
7	————
8	-7.9V
9	7.9V

Q602 (TA7325P)

1	0.8V
2	1.3V
3	3.6V
4	9.4V
5	0V
6	3.6V
7	1.3V
8	0.8V
9	0V

Q608 (NJM4558D-A)

4	-12.1V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	11.7V

Q624

E	4.2V(P,R) 11.6V(F,W) 12.3V
C	4.2V(P,R) 0V (W) 11.8V
B	3.5V(P,R) 10.9V (F) 11.8V

Q617

E	4.6V(P) 4.9V(R) 0V
C	4.6V(P) -7.1V
B	4V (P) 4.7V(R) 0V

Q623

E	4.2V (P,R) 11.6V (F,W) 12.3V
C	0.1V(P,R,F) 11.8V
B	4.2V(P,R) 10.9V(W) 11.8V

Q615

E	4.2V(P) 4.5V(R) 0V
C	4.2V(P,R) -11.8V
B	3.6V (P) 4.7V (R) 0 V

Q616

E	4.2V(R) 0 V
C	4.2V(P,R) -11.8V
B	3.6V (R) 0 V

Q611 (TC9121P)

12	6V (STOP) 4.8V(P,FF,REW)	13	————
11	6.3V	14	6V
10	6.3V	15	0V 5.4V (P)
9	6.3V	16	0V 5.4V (R)
8	6.3V	17	————
7	6.3V	18	————
6	6.3V	19	0V 5.5V
5	6.3V	20	————
4	6.3V	21	0V 5.5V(W)
3	6.3V	22	0V 5.5V(F)
2	6.3V	23	————
1	0V	24	6.3V

Q609 (TC4011UBP)

7	0V (STOP) 0V (OTHERS)	8	3V (MOV, PULSE 5V) 3V (OTHERS)
6	0V (STOP) 4V (MOV) 0V (OTHERS)	9	3V (MOV, PULSE 5V) 3V (OTHERS)
5	0V (STOP) 4V (MOV) 0V (OTHERS)	10	5V (MOV, PULSE 0V) 6V (OTHERS)
4	6.3V (STOP) 4.5V (MOV, PULSE 0.5V) 6V (OTHERS)	11	0V (STOP) 5V (MOV, PULSE 0V 0V (OTHERS)
3	6.3V (STOP) 6V (S5 ON, OFF) 6V-0V(S5 ON-OFF PULSE 5V)	12	6.3V (STOP) 6 V (MOV)
2	6.3V (STOP) 6 V (MOV)	13	6.3V (STOP) 4.8V (MOV, PULSE 0.5V) 6 V (OTHERS)
1	0V (STOP) 0V(S5 ON, OFF) 4V(S5 ON-OFF PULSE 1V)	14	6.3V (STOP) 6 V

Q603 (TC4016BP)

8	9	10	11	12	13	14
0 V	0 V	0 V	0 V	4.5V(P) -7V	4.5V(P) -7V	7.2V
7	6	5	4	3	2	1
-7.2V	6.2V(R) -7.1V	6.2V(R) -7.1V	0 V	0 V	0 V	0 V

Q605 (NJM4558D-A)

4	-12.1V	5	0V
3	0V	6	0V
2	0V	7	0V
1	0V	8	11.7V

Q610 (TC4069UBP)

8	9	10	11	12	13	14
6.2V(R) 0V	0V(R) 6.3V	0V(R) 6.3V	————	0V(P,R) 6V	————	6.3V(STOP) 6V (MOV)
7	6	5	4	3	2	1
0 V	0V (R) 6.3V	5.4V(R) 0V	0V (R) 6V	5.4V(R) 0 V	0V(P,R,F,W) 6.2V	0V 3.2V(P) 3.6V(R) 4.7V(F) 5.2V(W)

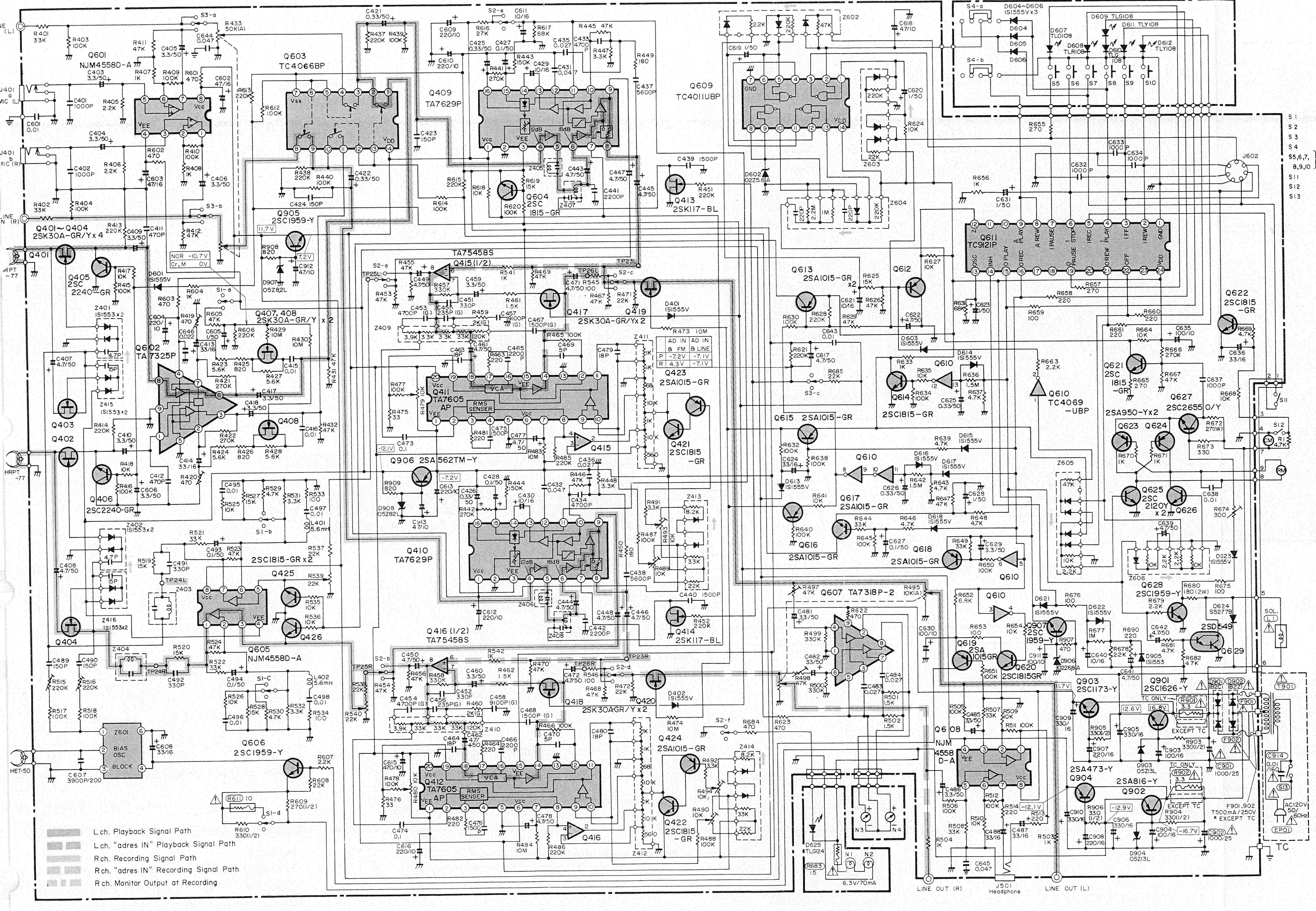
Q606

E	-5.9V(NOR) -7.7V(CrO_2) -11.4V(Metal) } R -12.9V(Others)	C	-5.7V(NOR) -7.6V(CrO_2) -11.1V(Metal) } R 0 V(Others)	B	-5.2V(NOR) -7V(CrO_2) -10.7V(Metal) } R -12.9V(Others)

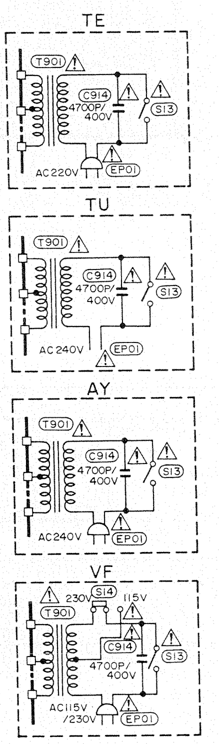
Q619

E	0.8V(R) 0 V	C	-9.2V(Metal) -5.6V(CrO_2) -3.7V(NOR) } R -12.9V(Others)	B	0.2V(R) 0V

10. SCHEMATIC DIAGRAM


J401 a MIC (L)
J401 b MIC (R)
LINE IN (L)
LINE IN (R)
Q401~Q404 2SK30A-GR/Y x 4
Q601 NJM4558D-A
Q602 TA7325P
Q603 TC4066BP
Q409 TA7629P
Q410 TA7629P
Q411 TA7605AP
Q412 TA7605AP
Q415 (1/2) TA75458S
Q416 (1/2) TA75458S
Q417 Q419 2SK30A-GR/Y x 2
Q418 Q420 2SK30A-GR/Y x 2
Q405 2SC2240-GR
Q406 2SC2240-GR
Q407, 408 2SK30A-GR/Y x 2
Q413 2SK117-BL
Q414 2SK117-BL
Q421 2SC1815-GR
Q422 2SC1815-GR
Q423 2SA1015-GR
Q424 2SA1015-GR
Q425 Q426 2SC1815-GR x 2
Q604 2SC1815-GR
Q605 NJM4558D-A
Q606 2SC1959-Y
Q607 TA7318P-2
Q608 NJM4558D-A
Q609 TC4011UBP
Q610 TC4069-UBP
Q611 TC9121P
Q612
Q613 2SA1015-GR x 2
Q614 2SC1815-GR
Q615 2SA1015-GR
Q616 2SA1015-GR
Q617 2SA1015-GR
Q618 2SA1015-GR
Q619 2SA1015GR
Q620 2SC1815GR
Q621 2SC1815-GR
Q622 2SC1815-GR
Q623 Q624 2SA950-Y x 2
Q625 Q626 2SC2120Y x 2
Q627 2SC2655 O/Y
Q628 2SC1959-Y
Q629 2SD549
Q901 2SC1626-Y
Q902 2SA816-Y
Q903 2SC1173-Y
Q904 2SA473-Y
Q905 2SC1959-Y
Q906 2SA562TM-Y
Z601 BIAS OSC BLOCK
HET-50
J602
J5C1 Headphone
LINE OUT (R)
LINE OUT (L)
6.3V/70mA
T901
F901, 902 T500mA/250V * EXCEPT TC
TC ONLY
EXCEPT TC
TC
L.ch. Playback Signal Path
L.ch. "adres IN" Playback Signal Path
R.ch. Recording Signal Path
R.ch. "adres IN" Recording Signal Path
R.ch. Monitor Output at Recording

S 1	Lever Switch (Tape Select)	CrO2 Position
S 2	Slide Switch (NR Select)	OUT Position
S 3	Lever Switch (Input Select)	LINE Position
S 4	Slide Switch (Timer Select)	OFF Position
S5,6,7, 8,9,10	Key Switch (Logic Operation Select)	OFF Position
S 11	Leaf Switch (Erasure Prevention)	OFF Position
S 12	Leaf Switch (Tape Detect)	OFF Position
S 13	Push Switch (Power)	OFF Position


TE
AC220V
TU
AC240V
AY
AC240V
VF
AC115V /230V
230V 115V
T901
C914 4700P/400V
S13
EP01

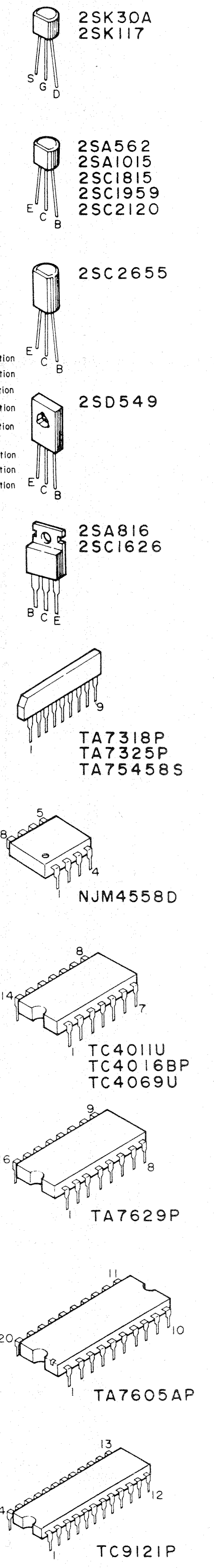
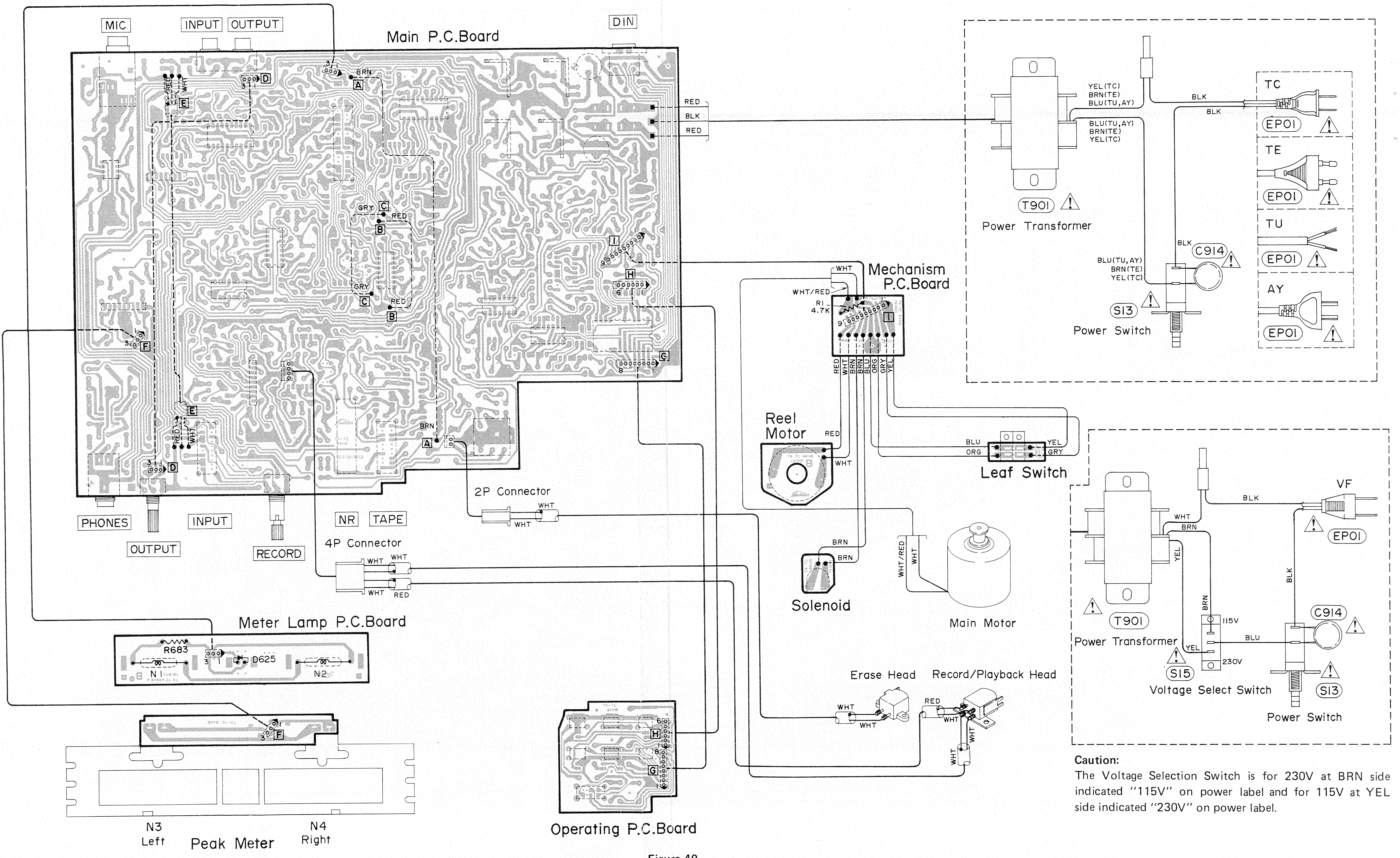

2SK30A
2SK117
S G D
2SA562
2SA1015
2SC1815
2SC1959
2SC2120
E C B
2SC2655
E C B
2SD549
E C B
2SA816
2SC1626
B C E
TA7318P
TA7325P
TA75458S
NJM4558D
TC4011U
TC4016BP
TC4069U
TA7629P
TA7605AP
TC9121P

Figure 39

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replace only with types identical to those in the original circuit or specified in the parts list.

11. WIRING DIAGRAM

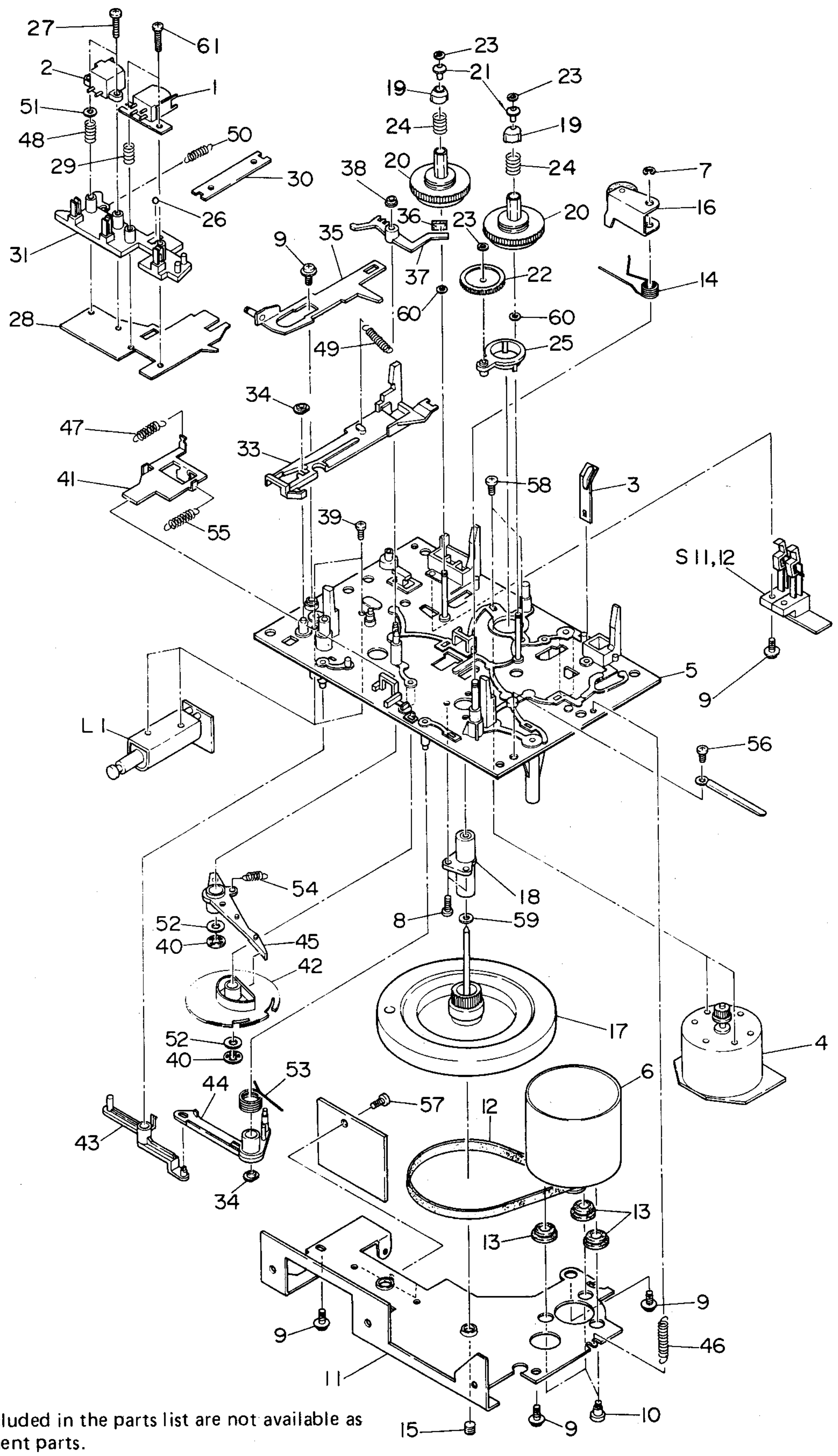

MIC
INPUT
OUTPUT
Main P.C.Board
DIN
BRN
RED
BLK
RED
GRY
RED
GRY
RED
BRN
PHONES
INPUT
OUTPUT
NR
TAPE
RECORD
2P Connector
WHT
WHT
4P Connector
WHT
WHT
WHT
RED
Meter Lamp P.C.Board
R683
D625
N1
N2
N3
Left
Peak Meter
N4
Right
Operating P.C.Board
YEL(TC)
BRN(TE)
BLU(TU,AY)
BLU(TU,AY)
BRN(TE)
YEL(TC)
BLK
BLK
TC
EP01
TE
EP01
TU
EP01
AY
EP01
T901
Power Transformer
BLK
C914
BLU(TU,AY)
BRN(TE)
YEL(TC)
S13
Power Switch
WHT
WHT/RED
R1
4.7K
Mechanism
P.C.Board
RED
WHT
BRN
BRN
BLU
ORG
GRY
YEL
Reel
Motor
RED
WHT
BLU
ORG
YEL
GRY
Leaf Switch
BRN
BRN
Solenoid
WHT/RED
WHT
Main Motor
Erase Head
Record/Playback Head
WHT
WHT
RED
WHT
WHT
WHT
VF
BLK
WHT
BRN
YEL
EP01
BLK
T901
Power Transformer
BRN
115V
BLU
YEL
230V
C914
S15
Voltage Select Switch
S13
Power Switch

Caution:

The Voltage Selection Switch is for 230V at BRN side indicated "115V" on power label and for 115V at YEL side indicated "230V" on power label.

Figure 40

12-1. EXPLODED VIEW (MECHANISM)



NOTE: Parts excluded in the parts list are not available as replacement parts.

Figure 41

12-2. MECHANISM PARTS LIST

Symbol No.	Part No.	Description
1	22217357	Head, Record/Playback HRPT-77
2	22218223	Head, Erase HET-50
3	25779142	Spring, Holder
4	25791358	Motor Ass'y, Reel
5	25791299	Chassis Ass'y, Mechanism
6	25791341	Motor Ass'y, Main
7	22703118	E Washer
8	22707366	Screw, DT BID , 2.6ϕ x 6mm
9	22707361	Screw, T PAN 2.6ϕ x 8mm
10	22707429	Screw, Special 2.6ϕ x 1.8mm
12	25755480	Belt, Main
13	25761238	Cushion, Motor
14	25773526	Spring, Pinchlever
15	25783233	Screw, Trust
16	25717470	Lever, Ass'y, Pinch
17	25717471	Flywheel Ass'y
18	25717472	Bushing Ass'y, Capstan
19	25754304	Reel, Coller
20	25754383	Reel, Drum
21	25754384	Capstan, Reel
22	25756241	Gear, Transfer
23	25766050	Washer
24	25777033	Spring, Reel
25	25713539	Take up Lever Ass'y
26	25757120	Steel, Ball, 3ϕ
27	22707692	Screw, DT BID, 2ϕ x 14mm
29	25772240	Spring, Head
30	25779140	Spring, Headslide
31	25783232	Head, Base
33	25782425	Lock Slider, D
34	25783226	Bush
36	25762406	Felt, Friction
37	25782418	Lever, Tention
38	25783199	Washer
39	22707475	Screw, BID, 2.6ϕ x 4mm
40	20798033	Ring
42	25756248	Gear Cam Play, D
43	25782414	Lever, Solenoid
44	25782415	Lever, Lock, Play
45	25782422	Lever, Play
46	25776313	Spring
47	25776315	Spring
48	25777036	Spring, Erase Head
49	25776309	Spring, Lock Slider
50	25776317	Spring, Head Base
51	22703318	Washer, 2ϕ
52	22703269	Washer, 3ϕ
53	25773529	Spring, Play Lock Lever
54	25776288	Spring, Play Lever
55	25771806	Spring, Play Slider

Symbol No.	Part No.	Description
56	22707301	Screw, BID, 2.6ϕ x 8mm Tapping
57	22707350	Screw, DT BID, 2.6ϕ x 5mm
58	22707323	Screw, BID, 2.6ϕ x 8mm
59	25764398	Washer, 2.5ϕ
60	25764597	Washer
61	22707669	Screw, DT BID, 2ϕ x 12mm
77	22707716	Screw, BID, 2.6ϕ x 3.5 mm

13-1. CABINET PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

PC-X44AD Only

Symbol No.	Part No.	Description
301	25881164	Front Panel Ass'y
302	25775220	Spring, Eject
303	25828990	Holder Ass'y, B
304	25824247	Reflector
305	25837558	Knob, Eject
306	25832501	Holder Ass'y, Cassette
307	25837521	Knob, Counter Reset
308	25858579	Damper
309	25873240	Counter
310	25838723	Top Cover
311	25837561	Knob, Record Left
312	25837562	Knob, Record Right
313	25837619	Knob, Output
314	25837403	Knob, Slide
315	25837560	Knob, Lever
316	25837565	Knob, Ass'y, Power
317	22828070	Foot
318	25829439	Bottom Plate, Mold
320	25864051	Jack Plate (TE)
320	25864052	Jack Plate (TU, AY)
321	25755351	Belt, Counter
322	25837589	Marker, B
⚠ 323	25845528	Bush, Nylon
324	22195771	Wire, Remote (S2)
325	22707118	Screw, BID, 3ϕ x 12mm
326	25832485	LED Holder, Meter
327	25844517	LED Holder
331	22705022	Rivet, Plastic, 3ϕ x 5.5mm
332	22707519	Screw, DT BID, 4ϕ x 10mm
333	22701394	Screw, PAN, 3ϕ x 8mm
334	22707115	Screw, BID, 3ϕ x 8mm Tapping
335	22707590	Screw, T PAN, 3ϕ x 8mm
336	22701326	Screw, BID 3ϕ x 8mm Tapping
337	22707066	Screw, BID, 3ϕ x 6mm
338	22707301	Screw, BID, 2.6ϕ x 8mm Tapping
339	25829447	Cover, Cassette
340	25837544	Bottom, A, Small
341	25837545	Bottom, B, Large
342	25837547	Case, Reflect A, Small
343	25837548	Case, Reflect B, Large
344	25832478	Reflector, Meter
345	22707165	Screw, BID, 3ϕ x 10mm Tapping

Symbol No.	Part No.	Description
348	25830225	Nut, 9ϕ
349	25833490	Sheet, Marker
351	25762407	Felt, Foot

13-2. EXPLODED VIEW (CABINET)

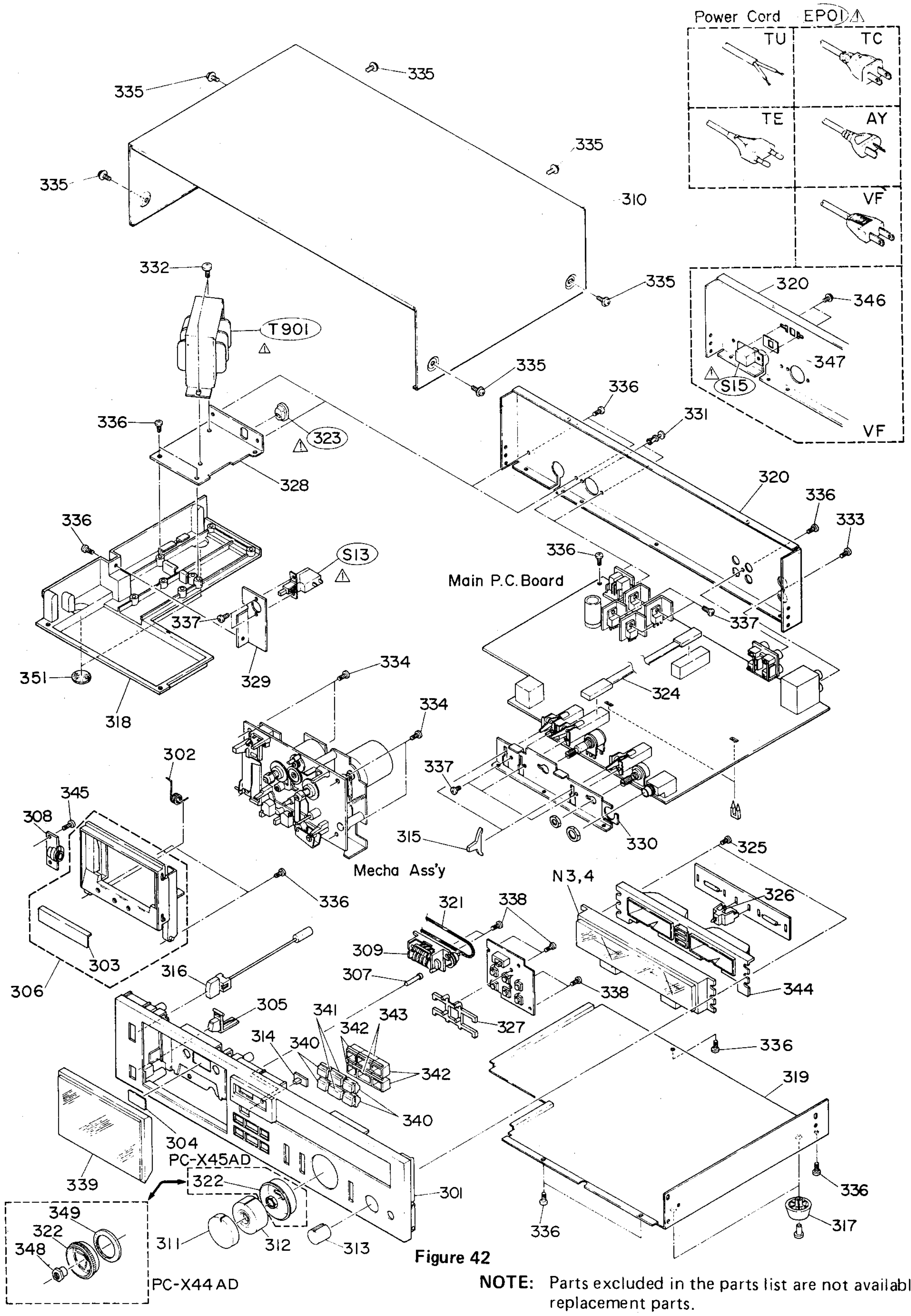

Power Cord EPOI⚠
TU
TC
TE
AY
VF
335
310
332
T901 ⚠
336
⚠ 323
328
320
346
347
⚠ S15
VF
331
333
S13 ⚠
Main P.C.Board
337
334
351
318
329
324
302
345
308
315
Mecha Ass'y
330
325
N3,4
326
336
321
338
309
307
306
303
316
305
341
343
342
327
344
314
340
319
304
PC-X45AD
322
301
339
349
348
311
312
313
317
PC-X44AD

Figure 42

NOTE: Parts excluded in the parts list are not available as replacement parts.

13-3. CABINET PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components wich have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

PC-X45AD Only.

Symbol No.	Part No.	Description
301	25881120	Front Panel Ass'y (TE, TU, AY, VF)
301	25881022	Front Panel Ass'y (TC)
302	25775220	Spring, Eject
303	25828951	Holder Ass'y, B
304	25824247	Reflector
305	25837546	Knob, Eject
306	25832490	Holder Ass'y, Cassette
307	25837521	Knob, Counter Reset
308	25858579	Damper
309	25873240	Counter
310	25838683	Top Cover
311	25837468	Knob, Record Left
312	25837469	Knob, Record Right
313	25837587	Knob, Output
314	25837475	Knob, Slide
315	25837579	Knob, Lever
316	25816639	Knob Ass'y, Power
317	22828070	Foot
318	25829439	Bottom Plate, Mold
320	25864035	Jack Plate (TE)
320	25864036	Jack Plate (TU, AY)
320	25864037	Jack Plate (VF)
320	25864034	Jack Plate (TC)
321	25755351	Belt, Counter
322	25832473	Ring, Decoration
⚠ 323	25845528	Bush, Nylon (TE, TU, AY)
⚠ 323	25845120	Bush, Nylon (VF, TC)
324	22195771	Wire, Remote (S2)
325	22707118	Screw, BID, 3ϕ x 12mm
326	25832485	LED Holder, Meter
327	25844157	LED Holder
331	22705022	Rivet, Plastic, 3ϕ x 5.5mm
332	22707519	Screw, DT BID, 4ϕ x 10mm
333	22701394	Screw, PAN, 3ϕ x 8mm
334	22707115	Screw, BID, 3ϕ x 8mm Tapping
335	22707696	Screw, T PAN, 3ϕ x 8mm
336	22701326	Screw, BID, 3ϕ x 8mm Tapping
337	22707066	Screw, BID, 3ϕ x 6mm
338	22707301	Screw, BID, 2.6ϕ x 8mm Tapping
339	25829438	Cover, Cassette
340	25837544	Bottom, A, Small
341	25837545	Bottom, B, Large
342	25837547	Case, Reflect A, Small
343	25837548	Case, Reflect B, Large
344	25832478	Reflector, Meter
345	22707165	Screw, BID, 3ϕ x 10mm Tapping
346	22707456	Screw, FL DT 3ϕ x 8mm (VF)
347	22950753	Label, Voltage (VF)
351	25762407	Felt, Foot

14. PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
TRANSISTORS, ICS AND DIODES		
Q401, 402		Transistor, 2SK30A-GR/Y
Q403, 404		
Q405, 406		Transistor, 2SC2240-GR
Q407, 408		Transistor, 2SK30A-GR/Y
Q409, 410		IC, TA7629P
Q411, 412		IC, TA7605AP
Q413, 414		Transistor, 2SK117-BL
Q415, 416		IC, TA75458S
Q417, 418		Transistor, 2SK30A-GR/Y
Q419, 420		
Q421, 422		Transistor, 2SC1815-GR
Q423, 424		Transistor, 2SA1015-GR
Q425, 426		Transistor, 2SC1815-GR
Q601	22114470	IC, NJM4558D-A
Q602		IC, TA7325P
Q603		IC, TC4066BP
Q604		Transistor, 2SC1815-GR
Q605	22114470	IC, NJM4558D-A
Q606		Transistor, 2SC1959-Y
Q607		IC, TA7318P-2
Q608	22114470	IC, NJM4558D-A
Q609		IC, TC4011U-BP
Q610		IC, TC4069U-BP
Q611		IC, TC9121P
Q612, 613		Transistor, 2SA1015-GR
Q614		Transistor, 2SA1815-GR
Q615, 616		Transistor, 2SC1015-GR
617, 618		
619		
Q620, 621		Transistor, 2SC1815-GR
Q622		
Q623, 624		Transistor, 2SA950-Y
Q625, 626		Transistor, 2SC2120-Y
Q627		Transistor, 2SC2655-Y
Q628		Transistor, 2SC1959-Y
Q629		Transistor, 2SD549
Q901		Transistor, 2SC1626-Y
Q902		Transistor, 2SA
Q903		Transistor, 2SC1173-Y
Q904		Transistor, 2SA473-Y
Q905		Transistor, 2SC1959-Y
Q906		Transistor, 2SA562-Y
Q907		Transistor, 2SC1959-Y
D401, 402		Diode, 1S1555V

Symbol No.	Part No.	Description
D601		Diode, 1S1555V
D602		Diode, 02Z5.6A
D603, 604		Diode, 1S1555V
D605, 606		Diode, 1S1555V
D607		Diode, TLO108
D608		Diode, TLR108
D609, 610		Diode, TLG108
D611, 612		Diode, TLY108
D613, 614		Diode, 1S1555V
D615, 616		
D617, 618		
D621, 622		
D623		
D624		Diode, S5277B
D625		Diode, TLG124A
⚠ D901		Diode, 1B2C1
⚠ D902		Diode, 1B2Z1
D903, 904		Diode, 05Z13L
D905		Diode, 1S1553
D906		Diode, 02Z6.8A
D907. 908		Diode, 05Z8.2L
ELECTRICAL PARTS		
⚠ T901	22223842	Transformer, Power (TE)
⚠ T901	22223843	Transformer, Power (TU, AY)
⚠ T901	22223841	Transformer, Power (TC)
⚠ T901	22223887	Transformer, Power (VF)
S1	22195825	Switch, Lever (TAPE)
S2	22195824	Switch, Slide (NR)
S3	22195825	Switch, Lever (INPUT)
S4	22195566	Switch, Slide (Timer)
S5, 6, 7	22195623	Switch, Key (Logic)
S8, 9, 10		
S11	22195727	Switch, Leaf (Erase Prevention)
S12	22195727	Switch, Leaf (Tape Detect)
⚠ S13	22195686	Switch, Push (Power) (TE, TU) (AY, VF)
⚠ S13	22195811	Switch, Push (Power) (TC)
S14	22195772	Switch, Drive (S2)
⚠ S15	22146186	Switch, Slide (Power Select) (VF)

Symbol No.	Part No.	Description
J401	22163658	Jack, Microphone
J501	22163776	Jack, Headphone
J601	22163831	Jack, US4P
J602	22167931	Socket, DIN 7P
⚠ L1	22147228	Solenoid
L401, 402	22211264	Coil, 5.6mH
N1, 2	22113535	Lamp, Pilot, 6.3V/70mA
N3, 4	22104554	Meter, Peak
Z401, 402	22130625	Composite Parts (SW P)
Z403, 404	22153158	Filter, Dolby 85 kHz
Z405, 406	22153158	Filter, Dolby 85 kHz
Z407, 408	22153157	Filter, Dolby 19 kHz
Z409, 410	22134147	Composite Parts (RRM-T18)
Z411, 412	22134146	Composite Parts (RRM-T17)
Z413, 414	22130606	Composite Parts (ADRES A)
Z415, 416	22130627	Composite Parts (SW R)
Z601	22132530	OSC Unit, Bias
Z602	22130585	Composite Parts (Logic E)
Z603	22130586	Composite Parts (Logic F)
Z604	22130584	Composite Parts (Logic D)
Z605	22130580	Composite Parts (Logic A)
Z606	22130582	Composite Parts (Logic B)
⚠ EP01	22176286	Cord, Power (TE)
⚠ EP01	22176536	Cord, Power (TU)
⚠ EP01	22176588	Cord, Power (AY)
⚠ EP01	22176573	Cord, Power (TC)
⚠ EP01	22176125	Cord, Power (VF)
⚠ F901, 902	22144408	Fuse, T500mA/250V, (TE, TU, AY, VF)

CAPACITORS

G = ±2%, J = ±5%, K = ±10%, M = ±20%, P = 0 + 100%,
Z = −20+ 80%
ABBREVIATIONS: EL = Electrolytic, CD = Ceramic Disk
MY = Mylar Film, PS = Polystyrene
PP = Polypropylene

C401, 402	22349102	CD, 1000pF, 50V, K
C403, 404	22488339	EL, 3.3mfd, 50V, M
C405, 406	22488339	EL, 3.3mfd, 50V, M
C407, 408	22488479	EL, 4.7mfd, 50V, M
C409, 410	22488339	EL, 3.3mfd, 50V, M
C411, 412	22349471	CD, 470pF, 50V, K
C413, 414	22485330	EL, 33mfd, 16V, M
C415, 416	22371103	MY, 0.01mfd, 50V, J
C417, 418	22488339	EL, 3.3mfd, 50V, M
C421, 422	22488338	EL, 0.33mfd, 50V, M
C423, 424	22349151	CD, 150pF, 50V, K
C425, 426	22488006	EL, 0.33mfd, 50V, K
C427, 428	22480003	EL, 0.1mfd, 50V, K
C429, 430	22485100	EL, 10mfd, 16V, M
C431, 432	22371473	MY, 0.047mfd, 50V, J

Symbol No.	Part No.	Description
C433, 434	22371472	MY, 4700pF, 50V, J
C435, 436	22371273	MY, 0.027mfd, 50V, J
C437, 438	22371562	MY, 5600pF, 50V, J
C439, 440	22371152	MY, 1500pF, 50V, J
C441, 442	22371222	MY, 2200pF, 50V, J
C443, 444	22488479	EL, 4.7mfd, 50V, M
C445, 446	22488479	EL, 4.7mfd, 50V, M
C447, 448	22488479	EL, 4.7mfd, 50V, M
C449, 450	22488479	EL, 4.7mfd, 50V, M
C451, 452	22349331	CD, 330pF, 50V, K
C453, 454	22321157	PP, 4700pF, 100V, G
C455, 456	22380124	PS, 235pF, 250V, G
C457, 458	22321181	PP, 9100pF, 100V, G
C459, 460	22488339	EL, 3.3mfd, 50V, M
C461, 462	22488479	EL, 4.7mfd, 50V, M
C463, 464	22362180	CD, 18pF, 50V, K
C465, 466	22349222	CD, 2200pF, 50V, K
C467, 468	22321094	PP, 1500pF, 100V, G
C469, 470	22361509	CD, 5pF, 50V, D
C471, 472	22488479	EL, 4.7mfd, 50V, M
C473, 474	22372104	MY, 0.1mfd, 50V, K
C475, 476	22349152	CD, 1500pF, 50V, K
C477, 478	22488479	EL, 4.7mfd, 50V, M
C479, 480	22362180	CD, 18pF, 50V, K
C481, 482	22488339	EL, 3.3mfd, 50V, M
C483, 484	22360549	CD, 0.027mfd, 25V, K
C485, 486	22488339	EL, 3.3mfd, 50V, M
C487, 488	22485330	EL, 33mfd, 16V, M
C489, 490	22349151	CD, 150pF, 50V, K
C491, 492	22349331	CD, 330pF, 50V, K
C493, 494	22488108	EL, 0.1mfd, 50V, M
C495, 496	22372103	MY, 0.01mfd, 50V, K
C497, 498	22371103	MY, 0.01mfd, 50V, J
C601	22342103	CD, 0.01mfd, 50V, Z
C602	22485470	EL, 47mfd, 16V, M
C603	22485470	EL, 47mfd, 16V, M
C604	22483221	EL, 220mfd, 10V, M
C605	22488109	EL, 1mfd, 50V, M
C606	22488339	EL, 3.3mfd, 50V, M
C607	22380101	PS, 3900pF, 200V, K
C608	22485330	EL, 33mfd, 16V, M
C609	22483221	EL, 220mfd, 10V, M
C610	22483221	EL, 220mfd, 10V, M
C611	22485100	EL, 10mfd, 16V, M
C612	22483221	EL, 220mfd, 10V, M
C613	22483221	EL, 220mfd, 10V, M
C615	22483471	EL, 470mfd, 10V, M
C616	22483221	EL, 220mfd, 10V, M
C617	22488479	EL, 4.7mfd, 50V, M
C618	22483470	EL, 47mfd, 10V, M
C619	22488109	EL, 1mfd, 50V, M
C620	22488109	EL, 1mfd, 50V, M

Symbol No.	Part No.	Description
C621	22485100	EL, 10mfd, 16V, M
C622	22488479	EL, 4.7mfd, 50V, M
C623	22488109	EL, 1mfd, 50V, M
C624	22485330	EL, 33mfd, 16V, M
C625	22480006	EL, 0.33mfd, 50V, K
C626	22480006	EL, 0.33mfd, 50V, K
C627	22488108	EL, 0.1mfd, 50V, M
C628	22488109	EL, 1mfd, 50V, M
C629	22488339	EL, 3.3mfd, 50V, M
C630	22483101	EL, 100mfd, 10V, M
C631	22488109	EL, 1mfd, 50V, M
C632	22349102	CD, 1000pF, 50V, K
C633	22349102	CD, 1000pF, 50V, K
C634	22349102	CD, 1000pF, 50V, K
C635	22483101	EL, 100mfd, 10V, M
C636	22485330	EL, 33mfd, 16V, M
C637	22349102	CD, 1000pF, 50V, K
C638	22342103	CD, 0.01mfd, 50V, Z
C639	22488479	EL, 4.7mfd, 50V, M
C640	22485100	EL, 10mfd, 16V, M
C641	22488479	EL, 4.7mfd, 50V, M
C642	22488479	EL, 4.7mfd, 50V, M
C643	22342103	CD, 0.01mfd, 50V, Z
C644	22342473	CD, 0.047mfd, 50V, Z
C645	22342473	CD, 0.048mfd, 50V, Z
C646	22342223	CD, 0.022mfd, 50V, Z
⚠ C901, 902	22486102	EL, 1000mfd, 25V, M
C903, 904	22485101	EL, 100mfd, 16V, M
C905, 906	22485331	EL, 330mfd, 16V, M
C907, 908	22485221	EL, 220mfd, 16V, M
C909, 910	22485331	EL, 330mfd, 16V, M
C911	22483101	EL, 100mfd, 10V, M
C912	22483470	EL, 47mfd, 10V, M
C913	22483470	EL, 47mfd, 10V, M
⚠ C914	22340150	CD, 4700pF, 400V, M (TE, TU, AY, VF)
⚠ C914	22340140	CD, 0.01mfd, 125V, P (TC)

RESISTORS

All resistors are carbon film 1/4W, ±5% unless otherwise noted. G = ±2%

R401, 402	22545333	33K ohm
R403, 404	22545104	100K ohm
R405, 406	22545222	2.2K ohm
R407, 408	22545102	1K ohm
R409, 410	22545104	100K ohm
R411, 412	22545473	47K ohm
R413, 414	22545224	220K ohm
R415, 416	22545104	100K ohm
R417, 418	22545103	10K ohm

Symbol No.	Part No.	Description
R419, 420	22658556	470 ohm, Semi-fixed
R421, 422	22545274	270K ohm
R423, 424	22545562	5.6K ohm
R425, 426	22545821	820 ohm
R427, 428	22545562	5.6K ohm
R429, 430	22545105	10M ohm
R431, 432	22545473	47K ohm
R433, 434	22655434	50K ohm, A, Variable
R437, 438	22545224	220K ohm
R439, 440	22545104	100K ohm
R441, 442	22545274	270K ohm
R443, 444	22545154	150K ohm
R445, 446	22555473	47K ohm
R447, 448	22555332	3.3K ohm
R449, 450	22545181	180 ohm
R451, 452	22545224	220K ohm
R453, 454	22545473	47K ohm
R455, 456	22545473	47K ohm
R457, 458	22545334	330K ohm
R459, 460	22550235	2K ohm, G
R461, 462	22545152	1.5K ohm
R463, 464	22545221	220 ohm
R465, 466	22545104	100K ohm
R467, 468	22545473	47K ohm
R469	22555473	47K ohm
R470	22545473	47K ohm
R471	22545223	22K ohm
R472	22555223	22K ohm
R473, 474	22545105	10M ohm
R475, 476	22545330	33 ohm
R477, 478	22545104	100K ohm
R479, 480	22658559	10K ohm, Semi-Fixed
R481, 482	22545221	220 ohm
R483, 484	22545105	10M ohm
R485, 486	22545224	220K ohm
R487, 488	22545104	100K ohm
R489, 490	22658559	10K ohm, Semi-fixed
R491, 492	22555332	3.3K ohm
R493, 494	22658559	10K ohm, Semi-fixed
R495, 496	22651553	10K ohm, A Variable
R497, 498	22658560	47K ohm, Semi-fixed
R499, 500	22545334	330K ohm
R501, 502	22545152	1.5K ohm
R503, 504	22545102	1K ohm
R505, 506	22545104	100K ohm
R507, 508	22545333	33K ohm
R509, 510	22545103	10K ohm
R511, 512	22545104	100K ohm
R513, 514	22545221	220 ohm
R515, 516	22658562	220K ohm, Semi-fixed
R517, 518	22545104	100K ohm
R519, 520	22545153	15K ohm
R521, 522	22545223	22K ohm

Symbol No.	Part No.	Description
R523, 524	22545473	47K ohm
R525, 526	22545103	10K ohm
R527, 528	22545153	15K ohm
R529, 530	22545472	4.7K ohm
R531, 532	22545332	3.3K ohm
R533, 534	22545470	47 ohm
R535, 536	22545103	10K ohm
R537, 538	22545223	22K ohm
R539, 540	22658584	22K ohm, Semi-fixed
R541, 542	22555102	1K ohm
R543, 544	22555105	10M ohm
R545, 546	22555101	100 ohm
R601	22545471	470 ohm
R602	22545471	470 ohm
R603	22545471	470 ohm
R604	22545102	1K ohm
R605	22545473	47K ohm
R606	22545224	220K ohm
R607	22545222	2.2K ohm
R608	22545223	22K ohm
R609	22547271	270 ohm, 1/2W
R610	22547331	330 ohm, 1/2W
⚠ R611	22500177	33 ohm, 1/4W, Fusible
R612	22545104	100K ohm
R613	22545224	220K ohm
R614	22545104	100K ohm
R615	22545224	220K ohm
R616	22545273	27K ohm
R617	22545683	68K ohm
R618	22555103	10K ohm
R619	22555153	15K ohm
R620	22545104	100K ohm
R621	22545224	220K ohm
R622	22545471	470 ohm
R623	22545471	470 ohm
R624	22545103	10K ohm
R625	22545153	15K ohm
R626	22545473	47K ohm
R627	22545103	10K ohm
R628	22545224	220K ohm
R629	22545473	47K ohm
R630	22545104	100K ohm
R631	22545683	68K ohm
R632	22545104	100K ohm
R633	22545681	680 ohm
R634	22545104	100K ohm
R635	22545103	10K ohm
R636	22555155	1.5M ohm
R637	22545472	4.7K ohm
R638	22545104	100K ohm
R639	22545472	4.7K ohm
R640	22545104	100K ohm
R641	22545103	10K ohm

Symbol No.	Part No.	Description
R642	22555155	1.5M ohm
R643	22545472	4.7K ohm
R644	22545333	33K ohm
R645	22545104	100K ohm
R646	22545472	4.7K ohm
R647	22545473	47K ohm
R648	22545472	4.7K ohm
R649	22545333	33K ohm
R650	22545104	100K ohm
R651	22545104	100K ohm
R652	22545682	6.8K ohm
R653	22545101	100 ohm
R654	22545103	10K ohm
R655	22545271	270 ohm
R656	22545102	1K ohm
R657	22545271	270 ohm
R658	22545221	220 ohm
R659	22545101	100 ohm
R660	22545221	220 ohm
R661	22545221	220 ohm
R663	22545222	2.2K ohm
R664	22545103	10K ohm
R665	22545271	270 ohm
R666	22545274	270K ohm
R667	22545473	47K ohm
R668	22545103	10K ohm
R669	22545472	4.7K ohm
R670	22545102	1K ohm
R671	22545102	1K ohm
R672	22570255	27 ohm, 1W, Metal Oxided Film
R673	22545331	330 ohm
R674	22658491	300 ohm, Semi-fixed
R675	22545101	100 ohm
R676	22545101	100 ohm
R677	22545105	1M ohm
R678	22545222	2.2K ohm
R679	22545222	2.2K ohm
R680	22570266	220 ohm, 1W, Metal Oxide Film
R681	22545472	4.7K ohm
R682	22545473	47K ohm
⚠ R683	22500174	15 ohm, 1/4W Fusible
R684	22545471	470 ohm
R685	22545223	22K ohm
R690	22545221	220 ohm
R691	22555225	2.2M ohm
⚠ R901, 902	22500168	3.3 ohm, 1/4W, Fusible (TC)
R903, 904	22547271	330 ohm, 1/2W
R905, 906	22547271	330 ohm, 1/2W
R907	22545471	470 ohm
R908, 909	22545821	820 ohm

Symbol No.	Part No.	Description
R1	22545472	4.7K ohm (Mechanism p.c.b.)
	ACCESSORIES	
AC01	22164775	Joint Cord
AC02	22903003	Owner's Manual (TE, TU, AY)
AC02	22903005	Owner's Manual (VF)
AC02	22903002	Owner's Manual (TC)
AC03	22990756	Head Cleaner